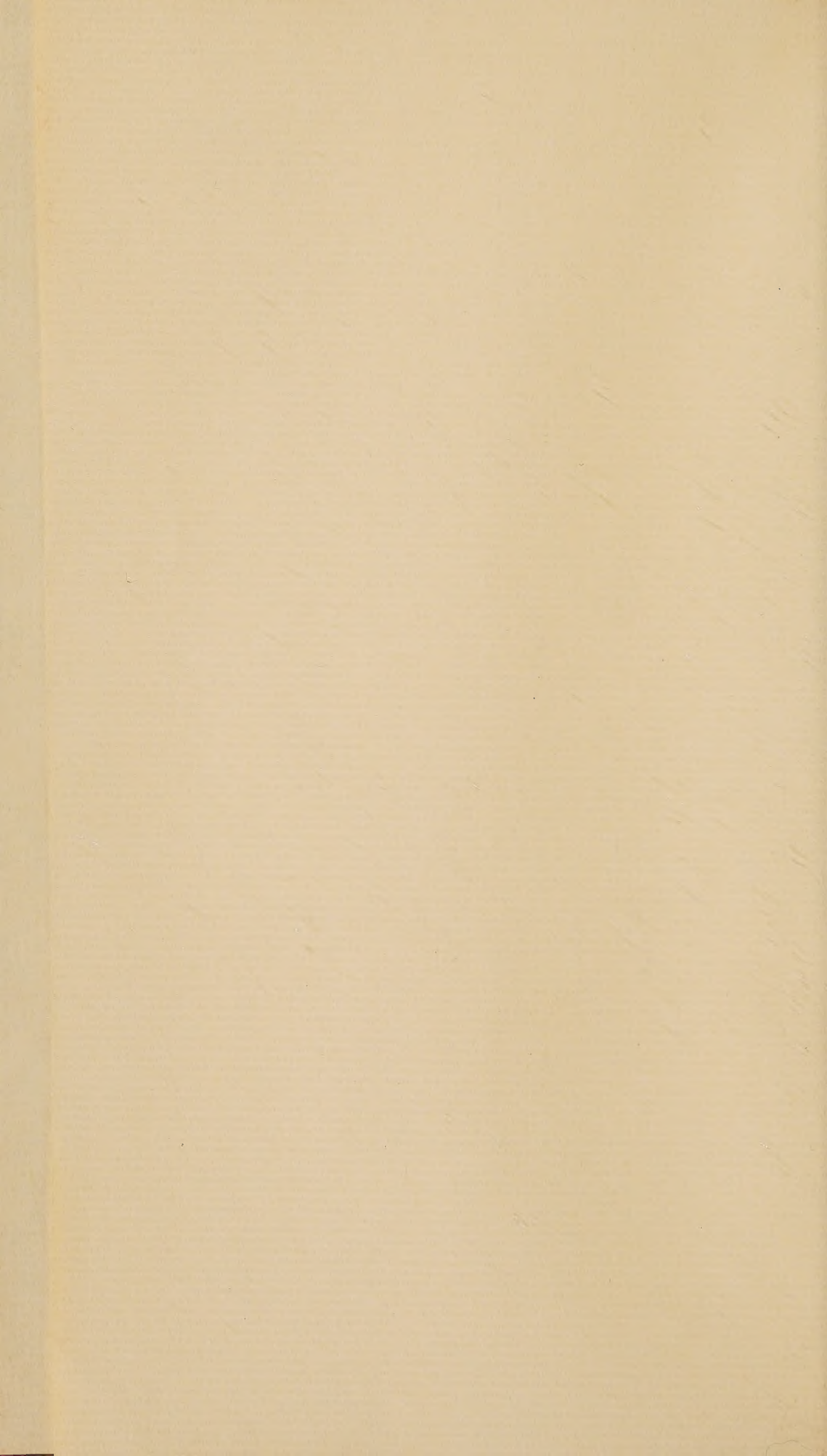


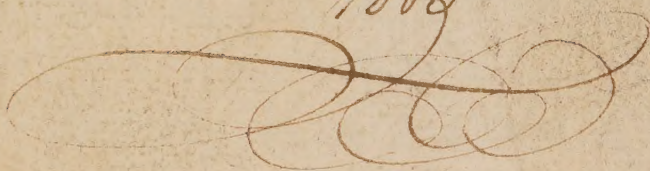
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Anthropologia Nova ;
OR, A
NEW SYSTEM
OF
ANATOMY.
Describing the
ANIMAL OECONOMY,
AND A
Short RATIONALE
Of many
DISTEMPERS
INCIDENT TO
Human Bodies.

In which are inserted divers *Anatomical Discoveries*, and *Medicinal Observations*, with the History of the Parts.

Illustrated with above Fourſcore Figures, drawn after the *Life* : And to every Chapter a SYLLABUS of the Parts describ'd, for the Instruction of Young *Anatomists*.

By JAMES DRAKE, M. D.
Fellow of the College of Physicians, and of the Royal Society.

V O L. II.

London, Printed for SAM. SMITH and BENJ. WALFORD,
at the *Prince's-Arms* in St. Paul's Church-Yard. 1707.

as great likewise whence this
Humour was separated. The most
recent Opinion, and the most
probable is that it is secreted
by some Glands about the Base
Of the Heart and its Capsule.

But these things are delivered
not Dogmatically but Prob-
-matically, and left to future
Inquiry. - - - - -

The Figure of

TO THE
RIGHT HONOURABLE
FRANCIS
Lord GUILFORD.

My Lord,

THE Author having intended to Dedicate this Volume to Your *Lordship*, as a Testimony of his Honour for, and Gratitude to Your *Lordship*; I should be unjust to his Memory, if I should not perform his Will, and beg Your Patronage of this his last Work. I shall not presume, *My Lord*, to Recommend it in any other Capacity, than as a Post-humous

humous Orphan, of a Person
 that sincerely Lov'd and Ho-
 nour'd You, for those Last-
 ing and Noble Qualities, Your
 extraordinary Humanity and
 Vertue ; and who I am assur-
 ed, if he had liv'd, would
 have taken this Occasion to
 oblige the World with a Cha-
 racter due to Your Merits
 But that being a Task not fit
 for any less Pen than his own
 I shall not presume, especial-
 ly in my Melancholy Cir-
 cumstances, to attempt it ; and
 shall only beg leave to Sub-
 scribe my self,

My Lord,

Your Lordship's most Humble

and most Obedient Servant,

JUDITH DRAKE.

A NEW SYSTEM OF ANATOMY. BOOK II.

*of the Parts of the Thorax
Middle^{or} Venter.*

CHAP. I

Of the Mammas or Breasts.

ON the outside of the Thorax, besides the common containing parts which have already been spoken to, appear the Breasts, one on each Side. In Women, of considerable Eminence & Use in Men, as they are of little Use so they make no great Figure: And therefore we shall take our Description of these Parts from the other Sex.

About

About the Time of Puberty
 or Eruption of the Menstrual
 Breasts begin to swell, and grow
 prominent, probably from a
 greater Afflux of Humours at
 that Time. Which not only
 fill the Vessels, but Dilate the
 Substance of them; which
 Opinion is confirmed by their
 shrinking when Age renders
 them unfit for Procreation
 and their Menstrues desert them.

Their Magnitude is various
 and indeterminate, biggest in
 Times of Gestation & Lactation
 At which Times they seem to
 grow spongy and compressible
 at others flump, but firm, especially
 in Women that have never been
 pregnant.

They resemble in Figure the
 the large section of a Globe
 having in the middle a Promine
 terminating in a blunt Point,
 which is the Papilla or Nipple
 Which in Virgins is of a fresh
 Pale reddish Colour, in those the

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give such, bluish; which in Age
turns to a blackish. in y^e extremity
of it are Divers perforations - on
Holes to which reach the Lacteal
Tubes.

Round about the Nipple is a pale
brownish Circle - which is call'd
the Arcola. Which is likewise
in different Ages & Circumstances
of different Colours.

The internal Substance of the
Mamma is compos'd of Glands
intermixt with Globules, and
Vessels of Fat.

The Glands are of different
sizes, and whilst Vigour lasts
look whitish: in Age they turn
yellow.

The Breasts receive Arteries
and Veins from the subclavian
which run under the Sternum till
they come just under the Mamma
where they pass outwards to them.

And besides these they find
many Branches which anastomose
with other Branches of the Hy-
pogastrics. There are likewise
other blood Vessels, which come
to them from the Intercostals &

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of Thoracicks. All the Vessels are
much larger, and more conspicuous
in those that give suck, than
in other Women, as is manifest
even upon external Inspection.
Their Vessels come from the
fifth Pair of the Spine and form
a Plexus about the Clavicle.
Besides which, there are others
which have not been distinctly
traced to their Originals, yet
perhaps it is material to trace them.

Dr Warton ascribes to the
a great Number of Lymphatics
which upon the Nodes of a Con
are very conspicuous, but are
not easily traced deep into the
substance tho' it is probable they
arise from thence, and exonerate
themselves into the Thoracic Dr.

Of all the Vessels belonging
to this Part, the most considerable
are the peculiar ones, the Lact
Pipes or Tubes which arise ver
slender, but meeting together
form Divers Trunks, which end
in the Papilla or Nipples. These
Tubes are not every where
equal Capacity, but being in
some Places more, in some less.

327.

less Dilated, form a sort of Cells
which seem contriv'd to hinder the
spontaneous Efflux, and to create a
Necessity of sucking to fetch it out.
Which notwithstanding is not always
necessary, for the Milk will fre-
quently run of its self out of a
full Breast that has been suck'd
much. Besides this Contrivance
Nature has fram'd Anastomoses, or
Communications between the Ducts,
to obviate the Inconvenience that
might arise from any casual Ob-
struction of one or more of them.
Of the Concurrence of these
Tubuli or Pipes, is the Substance
of the Papilla in great Measure
form'd, amongst which is interspers'd
a glandulous Substance, which
serves to keep them from compressing
each other, and with it are
intermixt Abundance of Fibres
drawn from the external Teguments
of the Papilla by means of which
the lacteal Vessels are constring'd,
And the Motion of the Milk is
modifi'd.

Some have imagin'd particular
Ducts from the Thoracic to the
Mamma but in my Opinion

without any Occasion
is probable that these Ducts never
had any existence, but in the Im-
agination of fanciful Men.

Besides these Vessels there
Abundance of Fatty Globules which
some would have only to serve
to fill up the Interstices of the
and to keep them moist: But
must needs agree with Malpighi
that they have a much nobler Use.

In all Milk the Butter and
Oil of it is a great Part, and
indeed Milk seems to be Noth-
else but Water and Oil united
by the Artifice of Nature, perhaps
by the Intervention of peculiar
Salts, which Milk its self has
ever sweet at first, Does after
little standing Discover to be
-is fully in It. and we find that
by the Mediation of Salts,
Water and Oil may be so mix-
ed as very much to resemble Milk
-so we cannot come up to the
Mechanism and make It.

CHAP. II.

Of the DIAPHRAGM.

THE DIAPHRAGM which divides the Abdomen from the Thorax is a Muscle of great Importance upon the Score of its Use in Respiration.

It is situated obliquely, being on the fore-part connected to the Sternum and Ribs, and on the hinder to the Vertebrae of the Loins which render its Position something slanting.

Its Figure is almost circular, varying only so much from it as the figure of the Cavity of the Body in that Part, and its two Processes, which it sends to the Vertebrae of the Loins unavoidably occasion it ~~to~~ to do.

It consists of two Muscles (or as some will have it, of three and perhaps not mistakenly) the foremost of the two is thin & broad, extended from the Sternum on each side to the spurious Ribs &

Vertebrae. The hinder is thick and has a fleshy Belly: It arises from the

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the Vertebrae of the Back by
Processes, which give Room for
the Division of it into two
The right which is the long
Springs with a triple Tendon
from the two or three first
Vertebrae of the Loins and
last of the Back. The left which
is shorter, & sometimes simple, &
sometimes double, arises from
last of the Back and first
the Loins, and sometimes from
only one of them. These Orig.
When nearly inspected, appear
to be tendinous. The Nails of
these Muscles end in a firm
Centre which is perforated to
the right side for the Vena
Cava; towards the left back
its fleshy part gives way to the
Gula: The Descending Groove
of the great Artery, Ductus
Thoracicus, and Vena Azygos
pass between its two inferior Pro-
cesses. The Veins of the Diaphragm
are pretty large, and go direct

to the Cava between its Entrance into the Thorax and the Liver, where two pretty large Branches from each side of the Diaphragm enter it.

It has Arteries immediately from the Aorta, and sometimes from the Celiac, and a few small Gvigs from the Lumbals and Adipose.

Verheyn mentions two Arteries & two Veins of his own Discovery, whereof the right Artery & the two Veins are Branches of the Subclavian. The left He does not pretend to have sufficiently traced, but says, that in the Diaphragm the Arteries & Veins inosculate with the aforementioned of their kind, and that the Veins receive some Branches in their Return from the Diaphragm, from the Pericardium and Mediastinum.

It receives a pretty large Nerve from the Plexus Cervicalis on each side, and from the second Pair of the Vertebra, which from a

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From a triple Root form a
considerable Branch, Which
distributes its self on each Si.
thro' the whole Body of the
Diaphragm.

In Inspiration, the Di-
aphragm descends towards the
Abdomen, which is its proper
Motion, which as a Muscle
is Contraction. In Expiration it
relax'd, and with the Costae
drawn upwards, and makes
Concave-Convex Figure; the Con-
cave side towards the Abdomen.
By this Alternation of Posture,
enlarges the Cavity of y^e Thorax
in Inspiration, of the Abdomen
in Expiration. By this recipro-
cative Motion, it serves as
well to Draw Down the Ribs
enlarge the Thorax, as to Com-
press the Abdomen, and that
to assist to the Expulsion of the
Contents of the Stomach and
Intestines and to the Exclusion
of the Fetus in Parturition

CHAP. III.

LUM.

Of the PLEURA & MEDIASTIN.

THE Pleura is a smooth Membrane lining the whole Inside of the Thorax, and consists of a double Membrane between the Duplicature of which pass the Vena Azygos and the intercostal Arteries & Nerves.

It has Arteries and Veins from ^{the} Intercostals, Mammaries and Diaphragmatics, and Nerves from the Intercostals.

It serves to line the Inside of the Thorax and render it smooth that the Lungs may not be hurt in their Motion.

Out of a Duplicature of this is form'd the Mediastinum, which divides the Thorax longitudinally, including betwixt its two Lamellæ the Heart, and affording Passage to the Oesophagus, Vena Cava

Vena Cava, and Stomachic Nerve.
It has Arteries and Veins for
the Mammaries and superior
Diaphragmatics, and some Branches
immediately from the great Artery
and Vein, which have been
called the Mediastina as proper
to it.

Its Nerves come from the
Stomachics and Diaphragmatics
Which in their Passage through
it bestow some Branches upon

It has Lymphatics Which
send to the Thoracic Duct. But
of this more when we speak
of the Pericardium.

CHAP. IV. Of the THYMUS.

THE THYMUS is a conglomerate Gland situate in
upper Part of the Thorax
just below the Division of
the Subclavian Arteries & V.
in a Fœtus, and in Children

new born large, soft 36g.
and white, abundantly bigger
than in Adults.

It has Arteries and Veins from
the Carotids and Jugulars, and
Nerves from the Par Vagus.
Over the surface of it runs di-
verse Lymphatics, but Whether
they come from the interior
substance of it, is not quite so
plain in fact, as it is from
Reason credible.

It is often found with a milky
Juice in new-born Children; its
Lymphaducts have no Valves in-
them; for by injecting a Liquid
into the Ductus Thoracicus, it
will pass into the Lymphaducts
of the Thymus; the like has
been observ'd by injecting Wax.

The Thymus has been therefore
thought to be a kind of Diver-
ticulum to the Chyle in the
Thoracick Duct when over charg'd,
as well as to receive the Lympha
from the adjacent parts in
order to transmitt it to the Thora-
cick Duct. The Space it takes

takes up in the Cavity of the
Thorax of a **F**etus must be
 very much crowded when the
 Lungs become distended by Re-
 spiration. whence it is the res-
 -bouring Lymphatick Glands, (as
 those about the Subclavian, and
 the internal Jugular Veins) are
 larger in the Adult when the
Thymus is less: and Vice versa
 less in the Fetus (in proportion
 when the Thymus is largest.

CHAP. V.

Of the HEART & PERICARDIUM

THE HEART is a Muscle
 situated in the Middle of the
Thorax into which the two
 great Veins (viz. Cava and P
 -monary) discharge themselves
 by the Mediation of its Auricle
 and from whence the Aorta
 Pulmonary Arteries arise, and
 by its reciprocal Action of
 Constriction and Dilatation

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is the main Instrument of the
Circulation of the Blood, and the
Foundation of all Vital Action.

It is included in a Capsula
or Pouch which consists of a
double Membrane, the Inner
arising from the Junicks of the
Vessels of the Heart, & the Outer
from the Mediastinum.

Its Figure is like that of the
Heart which is Conoid, and it Em-
braces the Heart loosely, allowing
Room for its Pulsation.

In Humane Bodies, and in them
only it is connected below, to the
Tendinous Part, or Centre of the
Diaphragm, whereas in Brutes it
is loose.

Externally it adheres to the Medi-
astinum, and in the superior
Part to the Veins and Arteries of
the Heart, for the Passage of
which it has several Perforations.

It receives Arteries and Veins
from the Mediastins, and from
the superior Diaphragmatics, in
the upper Part, and in the lower
from the Phrenick. Its Nerves
come from the Neighbouring Bran-
ches of the Par Vagus. And it

and it has likewise some Lym-
phatics which empty themselves
into the Thoracic Duct. 365.

Its Use is supposed to be the
Defence of the Heart, as liken-
ed to contain a soft serous Humour
which may serve to lubricate
and moisten the Heart.

This latter Opinion has been
somewhat controverted of late
by some who think that this
Water is not naturally there, but
that it is separated forcibly during
those convulsive Agonies which
usually happen in Articulo Mortis.

This Opinion is grounded on
the Difficulty that Anatomists
have met with in tracing the
Passage: For it does not yet pla-
ce appear which Way it comes, or
how it is carried off: And it
hard to imagin that the Quan-
tity always remains the same, or
that it could do so without
Putrefaction: Yet the Passages
through which it passes are
not being yet demonstratively dis-
covered, I must be contented to
leave it, as I find it, sub In-

Litem

The Doubt has been as gr.

The Figure of the Heart it self is that of a Cone or Pyramid revers'd: The upper and broader part of which is call'd the Basis, and the lower the Cone or Point.

Figure of
the Heart.
Tab. xi.
A. B. C.

Its Magnitude is indeterminate, and differing in several Subjects according to their respective Dimensions. However its ordinary length is about six Inches, and its breadth at the Basis betwixt four and five, and the whole Circumference about fourteen.

Magni-
tude.

It is situated in the middle of the *Thorax*, between the two Lobes of the Lungs, and is fastned to the *Mediastinum* and *Pericardium*, and supported by the great Blood-Vessels to which alone it is immediately connected, being for the convenience of its Motion disingag'd from any other Impediments.

Situation

It is cover'd with a thin *Membrane*, which about the Basis is guarded with Fat.

Mem-
brane.
ib. a. a.

It has two great Cavities or *Ventricles* of Capacities somewhat unequal: The right being of the two larger, and capable of containing between two and three Ounces of Blood, the left not containing so much by about half an Ounce.

Ventri-
cles.
App.
Tab. i.
Fig. 3.
E. F.

The *Ventricles* are divided by a thick fleshy Partition, consisting of the same Muscular Fibres that the *Parietes* of it do, and is call'd the *Septum*, the Figure of which

Septum.
ib. G.

B b

which is Concave towards the left Ventricle, and Convex towards the right. Between these Ventricles there is no immediate Communication. But the Blood circulates through the Lungs to arrive at one Ventricle from the other.

Parietes.

App.

Tab i.

Fig. 3.

The *Parietes* or *Sides* of these *Ventricles* are of a thickness and strength very unequal; the left being much thicker than the right because of its Office, which is to force the Blood through all parts of the Body; whereas the right drives it through the Lungs only, and is therein greatly assisted otherwise, as shall in proper place be shewn.

Columnæ

Carneæ.

ib. Fig. 1.

In these *Ventricles* are divers small *Muscles* deriv'd, and as it were detach'd from the *Parietes* of the *Ventricles*, and connected by *Tendinous* Extremities to the *Valves* of the Heart, and are by Authors diversly call'd *Columnæ Carneæ*, *Lacertuli*, &c. and these little *Muscles* or *Columnæ Carneæ*, being fastned to the *Parietes* of the Heart on one side, and the *Tricuspid* and *Mitral Valves* on the other, do by their Contraction in the *Systole* of the Heart draw out the *Valves*, and by that means not only shut up the Orifices of the Veins, but, as the Ingenious Mr. Comper observes, *More exactly close the Ventricles in their Systole, than they could have been, had they been smooth.*

The

These *Ventricles* are capp'd or cover'd each with an *Auricle*: These *Auricles* are two Muscles consisting of a double order of fleshy Fibres, as the *Ventricles* of the Heart themselves do, whose Proportion they seem exactly to follow, both as to Strength and Capacity, and in the Tendons of which they terminate. These *Auricles* are mov'd regularly after the manner of the Heart, the order only revers'd, that is, they are contracted whilst the Heart is dilated, and dilated whilst the Heart is contracted.

Auricles.
Tab. xi.
b. cc.

These *Vessels* which proceed from, and terminate in the Heart, and its *Auricles* are two Arteries, the *Aorta* and the *Pulmonary Artery*, which have their Origination from the *Ventricles* of the Heart: The *Aorta* from the left, and the *Pulmonary* from the right: And two *Veins* which terminate in the *Auricles* of the *Cava*, or great Vein in the right; and the *Pulmonary Vein* in the left.

Vessels
common.
ib. D. H. I

At the respective Orifices of these *Vessels* are placed *Valves*. At the Orifice of the *Arteries*, within each Artery are fix'd three *Semilunar Valves*, that is, three Membranes of a *Semilunar* Figure, which being expanded close the Orifice of the *Artery*, and hinder the Relapse of the Blood into the Heart at the time of its Dilatation. At the Mouth of the right Ventricle of the Heart, just

Valves.
App.
Tab. ii.
Fig. 3, 4,
5, 6.
Semilunar.

at its Juncture with the *Auricle*, are placed three other *Valves* call'd *Tricuspides* from their having three Points, which are fastned by tendinous Fibres to the *Columna Carnea* before mention'd, and upon the Contraction or *Systole* of the Heart close the Orifice of it, and hinder the Blood from recurring into the *great Vein*. The same Office the *Valvula Mitrales* (which are in number but two, and so call'd from their resemblance of a Mitre) do at the *Exit* of the *Left Ventricle*, stopping the return of the Blood into the *Pulmonary Vein*.

Tricuspid
App.
Tab. i.
Fig. 1.

Mitral.
ibid.

Substance The Substance of the Heart it self is intirely Fleshy or Tendinous, consisting of a continued Series of *Muscular Fibres* variously contorted or wound up, and ending at the *Orifices* of the respective *Ventricles*, and there forming the *Tendons*, by which means they make the Heart a *double Muscle*, or as some think *two Muscles*.

Strait
Fibres.
ib. Fig. 5.

As soon as the proper Membrane is taken off, there appear on the outward Surface on the right *Ventricle*, some slender *strait Fibres* tending to, and ending in the *Basis*.

Spinal.

Exterior
Order.

Fig. 11.

Immediately under these lyes a double order of *Spiral Fibres*. The *Exterior Order* of these ascend obliquely from the *Septum Cordis* to the *Basis*, forming thereby a sort of *Helix* or *Cochlea*.

Th

The *Interior Order* takes a Course just contrary to those which they lye under, and springing from the right side, wind obliquely towards the left, incompassing both *Ventricles*, and ending in the *Basis* on the left side, and so forming a *Helix* of an Inverse Order. Interior.

These Fibres are best discern'd in the unravelling a Sheep's or Ox's Heart after they have been well boyl'd. In which as soon as the Membrane of the Heart is taken off, the first Order readily appears, the Fibres of which do not all of them reach from the *Basis* to the *Cone*, but some of them taking a much shorter turn, as soon as they have measur'd about half the Circumference of the *Heart*, turning about with a kind of an *Arch*, go with an oblique Course to the Tendon of the other side and Ventricle. Method
of disco-
vering the
Fibres.

After these Fibres are remov'd, those of the left Ventricle appear, among which there are no strait ones, but first appears a Series of Fibres running spirally to the left, under which, as in the right Ventricle, lye another Order running just the contrary way. These Fibres do not, within the right Ventricle, extend only to the outward *Paries*, but encompassing the whole Ventricle, make the *Septum* appertain peculiarly to, and be a part of the left *Ventricle*. Many of these Fibres,

instead of terminating as the rest do in the *Tendons* of the *Heart*, run inwards and form the *Columnæ Carneæ*, of which we have spoken before. Others reaching down to the *Cone* are wound about it, and form that *Circle* which is call'd the *Centre*.

The Structure of the *Auricles* is so like that of the *Heart* of it self, that it needs no particular Description.

Vessels
proper.
Tab. xi.
a a.

The *Heart* has its *proper Blood-Vessels*. Two *Arteries* springing from the entrance of the *Aorta*, and one larger *Vein* with one or two lesser, all which from their encompassing the *Heart* are call'd *Coronariæ*.

Nerves.

The *Nerves* of the *Heart* and its *Auricles*, come from a *Plexus* of the *Par Vagus*, situated in the *Thorax* a little above the *Heart*, and call'd by *Willis*, *Plexus Cardiacus*.

Lymphaticks.

It has some *Lymphæducts* which carry the *Lymph* from the *Heart* to the *Thoracic Duct*.

Motion.

The use of the *Heart* and its *Auricles* is to circulate the *Blood* through the whole *Body*, and their *Motion* is alternate, and opposite to each other, the *Auricles* being dilated to receive the reflux *Blood* whilst the *Heart* is contracted, and contracted whilst the *Heart* is dilated to drive the *Blood* into it.

By means of the right *Ventricle* the Blood is driven through the *Pulmonary Artery* into the *Lungs*, and by the *Pulmonary Vein* is return'd again to the left *Ventricle*, from whence through the *Arteria Aorta* it is distributed all over the rest of the Body, and thence return'd again to the right *Ventricle* by the *Veua Cava*, so making an entire Circulation through the whole Body. This through the *Aorta* and *Cava* being a longer Circuit than that through the *Lungs*, a greater force is necessary to perform it, and therefore the *Parietes* of the last *Ventricle* are by Nature made much stronger than that of the Right.

Of the *Foramen Ovale* and *Canalis Arteriosus* in a *Fœtus*, we have taken sufficient notice before.

T A B. XI.

THE fore-part of the *Heart* and *Lungs* with their large Vessels, clear'd of the *Pericardium*.

A, The *Heart* in its natural Position with its *Cone* inclining to the *Left side*.

B, Its *Basis*.

C, Its *Cone*.

aa, The *Fat* about its *Basis*, with the *Coronary Arteries* and *Veins* running through it before they are distributed to the Substance of the *Heart*.

b, The external Surface of the *Right Auricle*.

cc, The Internal Surface turn'd out, to shew its *Carnous Fibres*.

D, The Trunk of the *Vena Cava* cut off immediately above the *Diaphragm*, slit open and expanded, in which may be seen

d, The *Foramen Ovale*, here closed.

EE, The Trunk of the *Vena Azygos* emptying it self into the *Superior* or *Descending Trunk* of the *Cava*.

F, The *Right Subclavian Trunk* pinn'd out.

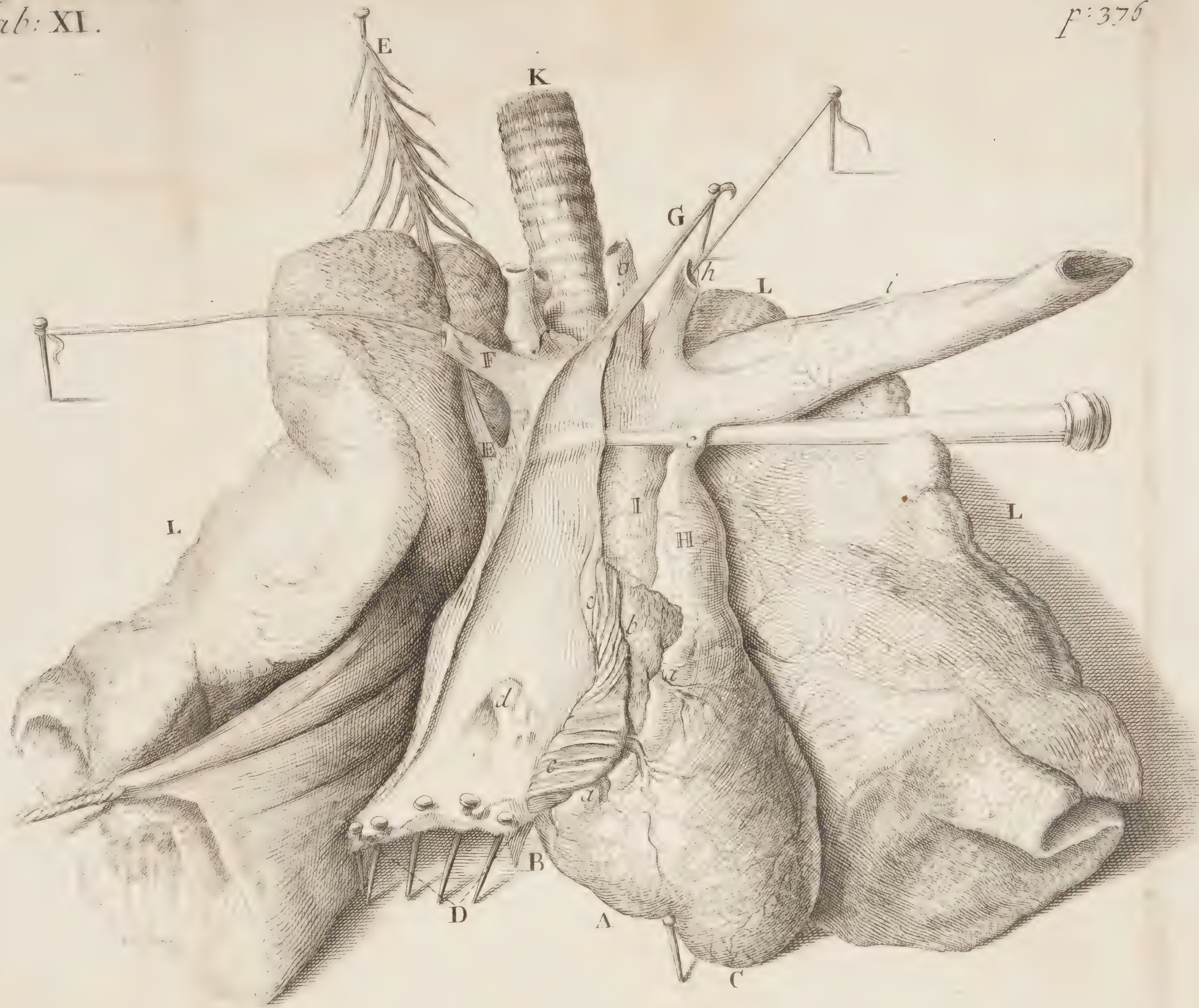
G, Part of the *Left* also pinn'd out.

H, The Trunk of that *Arteria Pulmonaris* as it arises out of the *Right Ventricle* of the *Heart*.

e, The *Canalis Arteriosus* converted into a *Ligament* between the *Pulmonary Artery* and *Descending Trunk* of the *Arteria Magna*.

I, The Trunk of the *Arteria Magna* arising out of the *Left Ventricle* of the *Heart*.

f, Its first long Trunk which is soon divided into *Two* (as here express'd) of which one makes





makes the Right *Carotid* the other the *Axillary* of the same side, both cut off in this Figure.

g, The Trunk of the *Left Carotid Artery*.

h, The *Left Axillary* Trunk also cut off.

i, The *Descending Trunk* of the *Arteria Magna*, freed from the back parts of the *Left Bronchia*, and from between the hinder parts of the *Lobes* of the *Lungs*, here drawn out and extended.

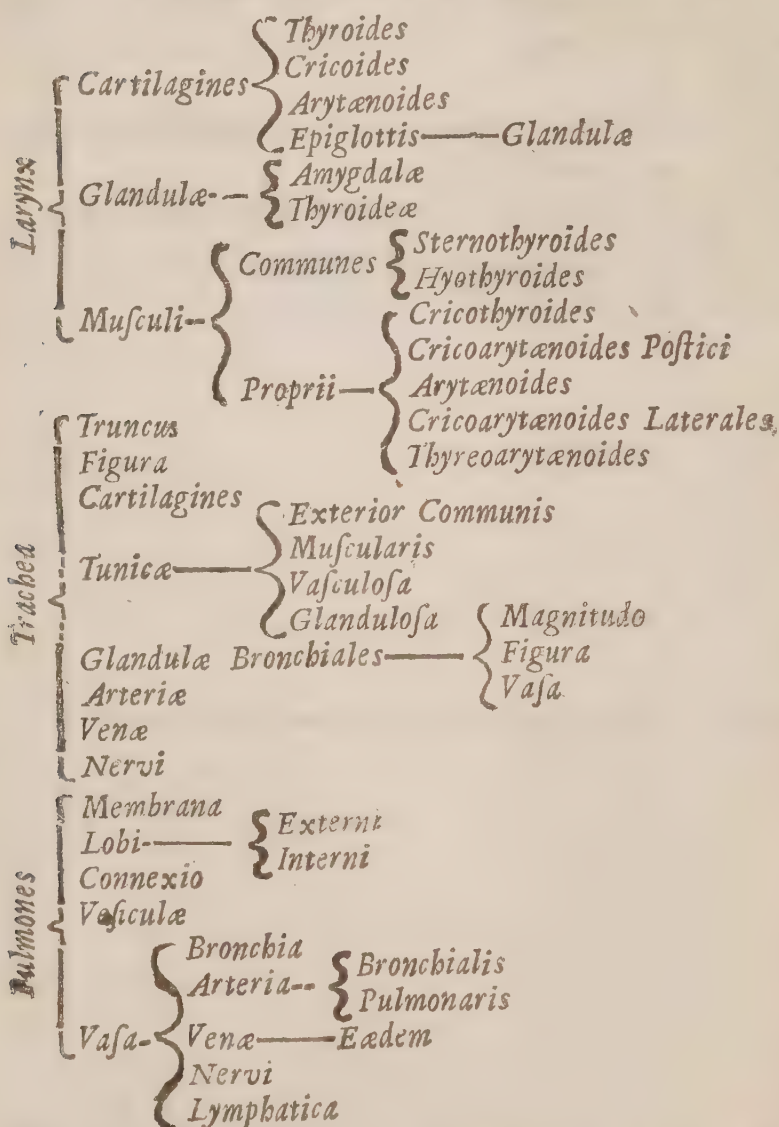
K, The Wind-pipe cut off immediately below the *Annular Cartilage*.

L, The *Right* and *Left Lobes* of the *Lungs*; those of the Right side being drawn out to shew the Trunk of the *Vena Cava*.

C H A P. VI.

Of the ASPERA ARTERIA and LUNGS.

SYLLABUS.

Partium ASPERAM ARTERIAM, &
PULMONES ConstituentiumAspera
Arteria.

THE ASPERA ARTERIA OF TRACHEA is a fistulous Tube compos'd of Cartilages and Membranes, descending from

from the *Fauces* into the *Lungs*, and distributed by infinite Ramifications through the Substance of them. Tab. xi.
K.

It runs along the fore-part of the *Oesophagus* as far as the fourth *Vertebra* of the *Thorax*, where it is divided into two principal Branches which are bestow'd on the *Lobes* of the *Lungs* on each side, and these again are innumerably ramify'd, sending a small Twig to every *Vesicle* of which the Substance of the *Lungs* is compos'd.

The upper part or Head of it is compos'd of five *Cartilages* of different Figures and Names. Larynx.

The biggest of these is that which guards the fore-part of it, and from the Form of a Shield, which fanciful Men resemble it to, has been call'd *Thyroides* and *Scutiformis*. It is of a *Concave-Convex* square Figure, the hollow part being inward and the Gibbous outward, having a little Prominence in the middle call'd *Pomum Adami*. It has four *Processes*, at each corner one, of which the two upper are the longer, and tye it by means of a Nervous Ligament to the under part of the *Os Hyoides* on each side; The lower and shorter connect it to the second *Cartilage*, which is call'd Carti-
lago Thy-
roides.
App.
Tab. viii.
Fig. 1C.

Cricoides or *Annularis* from its Figure, which is like that of a Turkish Ring. The fore-part of this is very narrow coming under the former *Cartilage*, but behind it Cricoides
ibid.
Fig. 11.
is

is broad, thick and strong, and is as it were the *Basis* of all the other.

Arytæ-
noides.

App.
Tab. viii.
Fig. 12.

The third and fourth are call'd *Arytæ-noides* or *Guttales*, from the Figure of an Ewer which these two *Cartilages* joyning together somewhat resemble. At the Junctionure of these two on the upper part of the *Larynx*, is a Chink bearing the Form of a little Tongue, and therefore call'd *Glottis* or *Lingula*. Through this Chink the Air descends into the *Lungs*, and the Pituitous Matter which is ejected by Coughing in *Catarrhs* is let out.

Epiglottis.
ib. b.

Over this Chink lies a fifth *Cartilage* call'd the *Epiglottis*, which is a thin soft *Cartilage*, and in Non-Adults almost Membranous, of a Figure near Triangular, Concave on the under side, and Convex on the upper. Its *Basis* is fastned to the *Thyroide Cartilage*, and its Point loose, that it may open and shut with the more ease. This *Cartilage* defends the entrance of the *Trachea*, and hinders the Liquids which in drinking slip over it into the *Oesophagus* from falling into the *Trachea*; on the Gibbous part or Back of the *Epiglottis*, lies a little *Caruncle*, or rather *Gland*, cover'd with Fat. The Concave part of it is beset with divers small *Glands* which serve to moisten it, and perhaps the *Trachea* likewise.

Glands of
the Epi-
glottis.

Near

Near the *Larynx* are situated four pretty large *Glands*; two of which, call'd the *Amygdalæ*, shall be accounted for among the *Glands* of the Mouth; The other two lye at the sides of the lower Cartilage of the *Larynx*, and are call'd *Glandulæ Thyroidæ*, which have no Excretory Duct (as yet discover'd) belonging to them, but are look'd on to be of the same kind with the *Thymus*, and discharge their *Lymphe* into the *Thoratick Duct*. Glandulæ Thyroidæ.

These *Cartilages* of the *Larynx* are mov'd by seven Pair of *Muscles*, two Pair of which are call'd *Common*, the other five *Proper*. The *Proper* *Muscles* are those which have both Origination and Insertion into the *Larynx*; The *Common* which have only their Insertion there. Muscles Common and Proper.

Verheyen not satisfy'd with this Division, as just and instructive, divides them into *External* and *Internal*, of which the *External* are the same with the *Common*, being situated upon, and on the outside of the rest, which he calls *Internal*, and are the same with the *Proper* in the vulgar Division. External and Internal.

These *Muscles* have compound Greek Names, which intimates both their Origination and Insertion.

The first *Common* or *External* Pair is call'd *Sternothyroides*, having its Head in the *Os Sternum* or Breast-bone, and its Tail Sternothyroides App. Tab. viii. in Fig. 16.

App. Tab. viii. in the *Thyroide Cartilage*, and serves to draw down that *Cartilage*.

Hyothyroides. Fig. 16. The second Pair is Antagonist to the former. Its *Head* is on the *Os Hyoides*, and *Tail* on the *Thyroide Cartilage*, serving to lift up that *Cartilage*, and is call'd *Hyothyroides*.

Cricothyroides ib. d. The first *Internal Pair* rises from the *Annular Cartilage*, and ascending obliquely on the hinder part, is inserted into the side of the *Thyroide*, and is call'd *Cricothyroides*. This Muscle dilates the *Scutiform Cartilage*.

Cricoa-rytænoides Posticum. ib. 13. The second *Internal Pair* arises from the back-part of the *Annular Cartilage*, and terminates in the *Arytænoid Cartilage*, and by its Action it draws back that *Cartilage*, and opens the *Rima*, and is call'd *Cricoa-rytænoides Posticum*.

Arytænoides. ib. c. c. The third Pair has its *Head* in one *Arytænoid Cartilage*, and its *Tail* in the other, and serves to bring them together and shut the *Rima*, and is call'd simply *Arytænoides*.

Cricoa-rytænoides Laterale. ib. 14. The fourth Pair arises from the side of the *Annular Cartilage*, and is inserted on the lower part of the *Arytænoides* of the same side; it serves to open the *Rima*, and is call'd *Cricoa-rytænoides Laterale*.

Thyreoarytænoides. The fifth and last Pair is the *Thyreoarytænoides*, situate under the *Cartilago Thyreoides*, from the fore and back part of which it proceeds with a very broad Head, and ends.

ends in the *Arytenoides*, which it constricts and shuts the *Larynx*.

The Trunk of the *Aspera Arteria*, which is continued from the *Larynx*, consists of *Cartilages* making an imperfect Circle clos'd on the hinder part by a Membrane, least the Stiffness and Resistance of the *Cartilages* pressing upon the *Oesophagus* might hinder Deglutition. These *Cartilages* are from the *Annularis* to the Division in number about twenty joyn'd together on the back part by a strong fleshy Membrane, which upon the *Cartilages* themselves is more Tendinous, and in that part not continuous, but interrupted by the Interposition of the *Cartilages* themselves. It consists of transverse Fibres approaching a circular Figure.

Trunk of
the Tra-
chea.
Tab. xi.
K.

Its Carti-
lages.

Muscular
Mem-
brane.

The inside of the *Trachea* is lin'd with a Membrane which is continued down to its smallest Ramifications. This is thinner than the former, and consists of longitudinal Fibres intersecting those of the other at right Angles. These Fibres do not all of them reach the whole length of the Air-pipe, but some of them terminate short in the intermediate *Cartilages*; others arise from them and are continued downwards. This *Tunic* is thought to be acutely sensible, and to be the occasion, that the least crum of any Solid, or drop of Fluid, slipping into the *Trachea*, raises a kind of Convulsive Cough.

Inner
Tunic.

Verheyen

Verhey-
en's Opi-
nion.

Verheyen thinks that this *Tunic* is cloth'd with another true Nervous Membrane, to which he chooses to ascribe this Acute Sense. But he gives neither Figure nor Description of it.

Tunicks
according
to Willis.

Between the two *Tunicks* lye a multitude of small Vessels, and very minute Glands, to each of which *Willis* allows a particular Membrane, calling one the Glandulous, the other the Vasculous Coat.

Exterior
Mem-
brane.

Besides these it has another outward loose Coat, which is divisible into several *Lamellæ*, and abounds with Blood-Vessels. By means of this Coat it is connected to the *Oesophagus* and other adjacent parts.

Verhey-
en's Bron-
chial
Glands.

Verheyen has discover'd another sort of *Glands* found generally about the *Bronchia* or Divisions of the *Aspera Arteria*, especially about the larger Branches of it, to which they adhere closely in pretty good Number, tho' he has found them sometimes at some distance from them, with a large Branch of the *Pulmonary Artery* between them, and of these he has observ'd so many, that he doubts whether there be any considerable Ramification of the *Bronchia* without them, and he has, as he says, counted an hundred or more in one subject.

Their Mag-
nitude.

These *Glands*, he says, differ in *Magnitude*: Those that lye nearest to the first and great Divisions being the largest, exceeding sometimes in bulk a Hazel Nut;
And

And tho' he has sometimes observ'd those which adhere to the lower Branches to be bigger than those above, yet he suspects them to be in a preternatural Condition.

Their *Substance* is naturally soft and succulent, cover'd with a common Membrane, and in Colour blackish. *Their Substance.*

Their *Figure* is various and irregular, some being almost *Oval*, others longer, and shap'd more like a Raisin, some triangular. &c. But the Surface of all is smooth enough to entitle them to the Name of *Conglobate Glands*. *Figure.*

They receive *Arteries* and *Veins* from the *Pulmonaries* for their common Function, and for their proper Nourishment from the *Bronchials*; their Nerves from the *Par Vagum*, especially the *Cardiac Plexus*. *Vessels.*

He confesses not yet to have seen their Excretory Ducts, but imagines them to be very short, and to reach only from the *Glands* to the inward Surface of the *Bronchia*.

Their *Use* he supposes to be to separate that Unctuous Humour, with which the Inside of the *Bronchia* is lin'd, and thereby to defend it from the Injuries which a cold, harsh dry Air might otherwise subject the *Lungs* to: And he thinks that the Hoarseness which arises from a Cold taken, may proceed from an Obstruction of these *Glands*, and that the Benefit which accrues

from taking *Oil of Almonds*, or other slippery smooth Medicaments, may proceed from their supplying the Defect of their Juice, and lubricating artificially the inside of the *Bronchia*. But it's well known that the *Miliary Glands* of the Wind-pipe and *Bronchia* supply that Humidity which moistens their insides, and these are only *Lymphatick Glands*, that become Tumid in Morbid Cases, insomuch that they often press the Wind pipe or some of its Branches before they enter the Lungs, and render the Patient *Asthmatick* which often proves fatal. These *Glands* are scarce visible in a *Fætus*.

Vessels of
the Trachea.

The *Trachea* has *Arteries* from the *Carotids* and from the *Bronchials*, and sends Veins to the *External Jugular*. These Vessels accompany it through its whole distribution.

The Lungs
Tab. xi.

Connexion.

The *Lungs*, which are the immediate Organ of Respiration, consist of Vessels and Membranous Vesicles. They are connected above to the *Fauces* by means of the *Trachea*, and below to the *Vertebrae* of the *Thorax*, and to the *Sternum* and *Diaphragm* by means of the *Pleura*.

ib. L.

They are divided into two great *Lobes*, and those again into others lesser, the Right sometimes into three or four, by means of some Fissures running from the fore to the back edge.

The

The *Great Lobes* when inflated, resemble each of them a *Horses Hoof* in Figure, but together they are liker an *Oxes* inverted. Lobes.
Tab. xi.
L L.

The *Substance* of the *Lungs* is Membranous, consisting chiefly of innumerable Cells or Vesicles, which seem to be nothing but Expansions of the Membranes of the *Bronchia* to which they hang, like Grapes in Clusters, so that by blowing into one of the Branches of the *Bronchia*, these Cells or Vesicles which belong to it will be blown up, the rest, which do not, remaining still flaccid and unalter'd. Substance

These *Clusters* of *Vesicles* or *Cells* are call'd the internal *Lobules*, by which names they are distinguish'd from the lesser *Lobes* spoken of. These *Lobules* are separated from one another by Interstices which receive the Vessels, and are fill'd up with Membranes propagated from the *Lobules*, and lying some *Parallel* some *Angular*. These *Lobules* discover and display themselves very exactly, if the larger Trunks of the *Bronchia*, being laid open, the lesser be blow'd into, by which means every *Lobule* belonging to that Branch will be inflated, and rise very distinctly and shew its Extent. Internal
Lobules.

The whole Substance of the Lungs is cover'd with a common *Membrane*, which is divisible into two Coats, the outer thin, smooth and Nervous, the inner somewhat thicker and rougher, consisting mostly of Membrane.

the Extremities of Vessels and Vesicles, through the impressi^on of which it is pitted, and resembles in some measure a Honey-Comb.

No Perforations.

Some affirm^t that there are in this Coat abundance of *Perforations* or *Pores* so dispos'd, that they readily imbibe any Humidity from the Cavity of the *Thorax*, but suffer nothing to escape into it: But this seems to be a Fancy grounded upon no justifiable Observation.

Vessels.

Its *Vessels* are the *Bronchia*, the *Pulmonary* and *Bronchial Arteries* and *Veins*, *Nerves* and *Lymphaticks*. Of these Vessels some are *Proper*, some *Common*, in respect to the Service they are of to the rest of the Body. The *Common* are the *Bronchia*, the *Pulmonary Artery* and *Vein*, the *Nerves* and the *Lymphaticks*. The *Proper* are the *Bronchial Artery* and *Vein*.

Bronchia

App.

Tab. viii,
ix, x.

The *Trachea* just before it enters the *Lungs*, divides it self into two Branches, sending to each *Lobe* one, which are again divided into innumerable Ramifications which are call'd *Bronchia*. The *Bronchia* and their Branches consist of *Cartilages* like the *Trachea*, only here the *Cartilages* are perfectly Circular without any Membranous hinder part, of which having left the *Oesophagus* they have no need. These *Circular Cartilages* are joyn'd together by the *Membranes* that invest them, and are capable of

of being shot out into length upon Inspiration, and of shrinking up and running into one another in Expiration when the Cavity of the *Thorax* is lessen'd. They send their little Ramifications to all the little *Vesicles* of the *Lungs*.

Along with these Air Vessels run the Branches of the *Pulmonary Artery* and *Vein*, sending their Ramifications exactly along with the other. The *Artery* bringing the Blood from the Right Ventricle, and the *Vein* carrying it back to the Left Ventricle of the Heart. Whether the Blood returns by the *Vein* impregnated with Air in the *Lungs*, is a Question of which I shall take occasion to speak more hereafter.

The *Bronchial Artery* arises from the hinder part of the *Aorta* a little above the *Base* of the Heart, whence turning off to the Right it embraces the *Trachea*, and after sending off a Branch or two to the *Oesophagus*, it pursues the Course of the *Bronchia*, accompanying all their Branches through their whole Progress. This *Artery* is sometimes single, but oftner there are two of them, and sometimes three, which rise at about a Fingers breadth or less distance from one another.

Concomitant to these *Arteries*, is a *Vein* whose Branches arise from the Ramifications of the *Capillary Arteries*. Whether the Blood

returns by one or more Trunks, is not yet sufficiently apparent. These Vessels bring Blood for the Nutriment of the *Bronchia* and *Vesicles* of the *Lungs*, and carry it back again.

Lympha-
ticks.
App.
Tab. ix.

Through the *Lungs* are distributed a great number of *Lymphaticks* attending generally the Blood-Vessels, and being at length collected, empty themselves into the *Thoracic Duct*.

Nerves.

Dr. *Willis*, contrary to the vulgar Opinion, ascribes to the *Lungs* a great Number of *Nerves*, which come from the Trunk of the *Par Vagum*, which being distributed through the Substance of the *Lungs*, embrace the Aerious and Sanguiferous Vessels.

T A B



Arteria

Pulmonalis

T A B. XII.

THE *Arteria Pulmonalis* fill'd with Wax and freed from the *Lungs*, and no more display'd, than they are suppos'd to be in Expiration, from an Adult as big as the Life.

A, Its Trunk cut close to the *Basis* of the *Heart* and ty'd up.

BB, Its Division to the Right and Left *Lobes* of the *Lungs*.

C, The *Canalis Arteriosus* converted into a Ligament.

bbb, The Extremities of the *Pulmonary Arteries* freed from the *Vesicles* of the *Lungs*, and their Conjunctions with the *Pulmonary Veins*.

C H A P. VII.

Of the Motion of the HEART, and Use of
R. E S P I R A T I O N.

Circulation of the Blood, by whom discovered.

THO' divers accurate Treatises of the *Heart*, and its Action, have been written by Learned Men of several Nations, especially by two of our own Country, the *Great* DR. HARVEY, to whose happy Sagacity this Nation owes the Glory of the Discovery of the CIRCULATION of the BLOOD; and the *Incomparable* DR. LOWER, to whom we are beholding for a compleat Display of the *Mechanical Structure* of the *Heart*, and a most ingenious Rationale of its Action. Yet there remain several Doubts and Difficulties about it (in my Opinion) not sufficiently accounted for, towards the resolving some of which, I shall offer what my own Thoughts have suggested to me, and leave it to the Consideration of the Reader.

Systole of the Heart sufficiently accounted for by Dr. Lower.

The *Learned* DR. LOWER (whose accurate Piece on this Argument will insure his Reputation so long as *Physical Knowledge* shall last in Esteem) has so well accounted for the SYSTOLE, or *Contraction* of the *Heart* from the *Mechanical Structure* of it, that he seems almost to have exhausted the Subject, and had he been as happy in
discovering

discovering the true Cause of the DIASTOLE, he had left little room for the Industry and Sagacity of others about this *Viscus*.

But having judiciously and solidly explain'd the *Systole*, he contents himself to ascribe the DIASTOLE to a Motion of *Restitution*, which Account gives me no Satisfaction: Because, the *Systole* being the proper, and (as himself confesses) the only Motion of the Heart, a State of *Contraction* seems to be the Natural State, and consequently without external Violence, it should have no *Diafsole* at all.

Diafsole
not so by
him or any
other Wri-
ter.

This will appear more plain, if we consider the Circumstances of it, and its Motion, as a Muscle, with respect to other Muscles. That *Contraction* is the proper Action and State of all Muscles, is evident from Experience of Fact, as well as Reason. For, if any Muscle be freed from the power of its *Antagonist*, it is immediately *contracted*, and is not by any action of the Will or Spirits, to be reduc'd to a state of *Dilatation*. Thus, if the *Musculi Flexores* of any Joint be divided, the *Extensores* of that Joint being by that means freed from the contrary Action of their *Antagonists*, that Joint is immediately extended without any consent of the Will, and in that state it remains; and so *Vice versâ* if the *Extensores* be divided. From whence it is plain, that the Muscles have no *Restitutive* Motion,

*Contra-
ction the
True Na-
tural State
of all Mus-
cles.*

but

but what they derive from the Action of their *Antagonists* by which they are balanced. Thus the *Sphincters* of the *Gula*, *Anus* and *Vesica*, having no proper *Antagonists*, are always in a state of Contraction and suffer nothing to pass them, but what is forced through them by the contrary Action of some stronger Muscles, which tho' not properly to be call'd *Antagonists* yet on all necessary Occasions perform the Office of such.

The Heart
a Muscle.

That the H E A R T is a *Muscle*, furnish'd and instructed for Motion like other Muscles is (in my Opinion at least) demonstrated beyond contradiction by Dr. *Lower* and others. And, as it is a *Solitary* Muscle without any proper *Antagonist*, and not directly under the power of the Will, not exercising *Voluntary* Motion, it approaches nearest to the *Sphincter* kind, which only has these Conditions in common with it. But in constant and regular Alternations of Contraction and Dilatation, it differs exceedingly from all the Muscles of the Body.

Reciprocal
Æstus
of the
Heart.

This *Reciprocal Æstus* of the *Heart* has given the Learned abundance of trouble who, finding nothing peculiar in the Structure, which should necessarily occasion it nor any *Antagonist*, whose re-action should produce it, have been extreamly perplex'd to find out the cause of it.

But

But passing over the various Opinions of Authors, to avoid being tedious, I shall take notice here only of the very Learned Dr. Lower's, in whose account of the *Systole*, however Solid and Ingenious, I observe something deficient, and whose *Hypothesis* of the *Diastole* I think to be precarious and false.

This excellent Author, having by sound Arguments, drawn from the Structure and Mechanism of the Heart, establish'd the certainty of its *Muscular* Motion, rests satisfied, without taking notice of any Assistance that the Heart receives from any other Part, except from the Brain, by the means of the eighth Pair of Nerves.

The Accurate Borellus in his *Oeconomia Animalis*, computes the *Motive* Power of the *Machine* of the Heart to be equal to, or to surmount that of a Weight of 3000 *l.* The *Obstacles* to the Motion of the Blood thro' the *Arteries* he esteems equivalent to 180,000 *l.* which is 60 times as much as he rates the Force of the Heart at. Then deducting 45,000 *l.* for the Adventitious Help of the *Muscular Elastick Coat* of the *Arteries*, he leaves the Heart with a Force of 3,000 *l.* to overcome a resistance of 135,000 *l.* that is, with one to remove 45.

This stupendous Effect he contents himself to ascribe to the *Energy* of *Percussion*. But, had he proceeded in his Calculation

Borellus's
Computa-
tion of the
Force of
the Ma-
chine of
the Heart.

Part 2d.
Prop. 67.
Prop. 73.

Prop. 76.

He ascribes
it to Per-
cussion.

to

to the Veins, which he allows to contain constantly a quantity of Blood, quadruple to the Contents of the Arteries, and to which this *Energy of Percussion* does either not reach at all, or but very languidly, he might probably have seen a necessity for some other Expedient to remove so insuperable a Difficulty.

But not to insist rigorously on the Exactness of this Calculation (tho' the great Abilities of the Author in this way, and his Ingenuity and Modesty, are a sufficient Warrant for the Accuracy of his Computations, and the Fidelity of his Accounts) we may allow a much greater Deduction than would be justifiable, without lessening the Difficulty. But this Account I have taken notice of purely for the sake of the Calculation, which may be of use in the Sequel, the Account it self being in other respects more defective than Dr. Lower's, to which we will return.

*Defect in
Dr. Lower's
Systole.*

The Doctor, notwithstanding his great Sagacity, appears (to me) to have overlooked something of great Moment and Importance in the Explication of the Action of the Heart. For, tho' it should be granted, that the *Muscular Fibres* of the Heart acted by the Nerves, are the immediate Instruments of its *Constriction* or *Systole*, yet it must not be denied, that the *Intercostal Muscles* and *Diaphragm* are

of great Service to aid and facilitate this Contraction, by opening a Passage for the Blood through the Lungs, which denied would be an invincible Obstacle.

*Intercostal
Muscles
and Dia-
phragm
promote
the Syftole*

Neither do they promote it that way only. The manner how they farther assist the Heart in its Contraction, will appear manifestly, if we consider the different Posture, Situation and Capacity of the Blood-Vessels of the Lungs in the several times of *Elevation* and *Depression* of the *Costæ*.

*More than
one way.*

The *Pulmonary Artery* rises from the *right Ventricle* of the Heart, and runs in one Trunk till it comes to the *Aspera Arteria*, where it is divided, and sends a Branch along with each Division of the *Aspera Arteria*, according to all the minutest Subdivisions, of which it is likewise subdivided, accompanying all the *Bronchi* in their whole progress through the Lungs.

*Rise and
Progress of
the Pul-
monary
Artery.*

The *Pulmonary Vein*, which empties it self into the *Left Ventricle* of the Heart, spreads it self on the *Aspera Arteria* and *Bronchi*, in the same manner that the Artery does.

*The same
of the
Vein.*

The necessary Consequence of this Disposition is, that this *Artery* and *Vein* being co-extended with, and fasten'd to the *Bronchi*, must needs suffer such alteration of *Superficial Dimensions*, as the *Bronchi* do in the *Elevation* and *Depression* of the *Costæ*.

*Conse-
quence of
the Stru-
cture.*

While

Bronchi
shrink in
Expira-
tion, and
so do the
Blood-
Vessels
that ac-
company
them.

While the Ribs are in a state of *Depression* (whether before Commerce with the external Air or after) the *Annular Cartilages* of the *Bronchi* shrink one into another, and by that means their *Dimensions* are exceedingly contracted. In conformity to this condition of the *Bronchi*, the *Pulmonary Artery* and *Vein* must likewise, either by means of their *Muscular Coats* contract themselves to the same *Dimensions*, or lie in *Folds* or *Corrugations*, which is less probable.

They shoot
out, and di-
varicate in
Inspira-
tion.

On the other hand, when the Ribs are elevated, and the *Diaphragm* bears downward, the Air rushing into the Lungs, shoots out the *Cartilaginous Rings*, and *Divaricates* the Branches of the *Trachea*, and by that extends and divaricates the several Divisions of the *Pulmonary Artery* and *Vein*, and thereby lengthens and enlarges their *Cavities*.

Capacity of
the Blood-
Vessels
consider-
ably in-
larg'd
thereby.

This enlargement of their *Cavities* is very considerable, not only upon the Score of the Addition, which they receive in length thereby, but also upon the account of the *Divarication*. For whereas, when the Ribs are depress'd, and the Lungs subside, the *Blood-Vessels* are not only contracted, (I have already observ'd) but their Branches which are exceeding numerous, approach one another, and lye in *juxta-position*, by which their *Cavities* are very much com-
press'd.

press'd and streighten'd: When the Ribs are elevated, and the Lungs turgid with Air, not only the Fibres, by which their Coats in the opposite State were contracted, are extended, but those innumerable Vessels, which lying before in Lines almost parallel one upon another, compress'd one another, making an *acute* Angle at their Junctures, are divaricated and separated from each other, and make an *obtuse*, whereby their Channels are widen'd.

Thus a passage is open'd to the Blood, from the *Right Ventricle* of the Heart to the *Left*, through the Lungs, to which it could not otherwise pass; and the Opposition which the Blood contain'd in that Ventricle, must otherwise necessarily have made to its Constriction, is taken off, and the *Systole* thereby facilitated.

*Passage
thereby
open'd for
the Blood.*

Nor is that all. For the *Diastole* being caus'd (as I shall in the sequel shew) by the Force of the Blood rushing into the Ventricles, this Ampliation and Extension of the *Pulmonary Artery* is a sort of *Check* or *Counterpoise* to it, and prevents an endeavour towards two contrary Actions at once, which must necessarily frustrate both. For the Heart being a *Springy, Compressible* Body, whose proper Action, which is Contraction, depends on the Influx of certain Fluids in its Fibres or Substance; and containing besides a Fluid in its *Ventricles*, or great Cavities,

*Diastole
whereon
depending.*

Action of
the Pul-
monary
Artery
compar'd to
that of a
Syringe.

Cavities, in one of which is the Mouth of this Artery, the Action of this Vessel must in great measure resemble that of a *Syringe* whose Extremity is immers'd in Water, the Enlargement or Expansion of the Channel of the Artery, answering the drawing of the *Embolum*, as the Constrictive Motion of the Muscle of the Heart does the Pressure of the *Atmosphere* upon the Surface of the Water, the one making way for the Fluid and the other forcing it to follow, where the resistance is least. In this Sense we may allow a sort of Attraction to the *Pulmonary Artery*, depending wholly upon the Action of the *Intercostal Muscles* and *Diaphragm* which we must therefore confess to be very serviceable and instrumental in promoting the *Systole* of the Heart.

But if the Learned Author be deficient in his account of the *Systole*; that is, if he has not observ'd all the Mechanism and Contrivance of Nature for the Contraction of the Heart; much less sufficiently has he accounted for the *Dia stole*, or Dilatation of it, which he ascribes to a Motion of *Restitution* of the over-strain'd Fibres, which yet he confesses are made for *Constriction* only. 'Tis true, he immediately after joins the *Influx* of the *Blood* as a concurrent cause; but from the slight notice that he takes of it, 'tis plain, that he did not so much as dream of any great share

it had in that Action. His Words are these.

Quin & (ut obiter hoc moneam) cum omnis motus contractione perficiatur, & Cordis Fibrae ad constrictionem solum factae sint, apparet quoque Cordis motum totum in Systole positum esse; cumq; Fibrae ultra tonum suum in omni constrictione ejus tendantur, idcirco ubi nixus iste absolvitur, motu quasi restitutionis Cor iterum relaxatur, & sanguine a Venis influente rursus distenditur; a nullo enim cordis motu, nisi tensionem suam remittente, & ab irruente sanguine Dia stole ejus libratis vicibus succedit.

De Corde
page 75.

Lowers's
Hypothesis
of the Di-
astole.

I have transcribed the entire Paragraph, because it contains his whole *Hypothesis* of the *Dia stole*, and all the notice that he takes of it thro' his whole Work. But how slender soever this may prove, it is the most substantial that I have any where met with, except a late one of Mr. *Corper*, which is properly an Improvement of this, and shall be considered in the sequel.

But, if Contraction be the sole Action of these Fibres (as this Great Man confesses it to be) and as indeed it is of all *Muscular* Fibres, I wonder how so judicious a Writer came to slip into such an absurdity, as to call their Distention (vulgarly but improperly called Relaxation) a Motion of *Restitution*. For from the Nature of those

Dia stole
a State of
Violence.

D d

Fibres,

Fibres, and their disposition, the Structure of the Heart appears manifestly to be *Tonical*, and its Dilatation a State of Violence; and consequently the Constriction is the *true* motion of *Restitution*, and the State to which it will *spontaneously* return, when the Force is taken off, which is the work of the *Intercostal* Muscles and *Diaphragm*.

Thus we are left still to seek for the true cause of the *Diastole*, which seems to me to be the main and most difficult *Phenomenon*, relating to the Heart and the Circulation of the Blood. But in Mr. Cowper's ingenious *Introduction* to his *Anatomy of Humane Bodies*, I find the Share which Dr. Lower hints the Blood to have in that Action, further prosecuted, and improv'd into the main Instrument of the Dilatation of the Heart, wherein I agree entirely with him. But as to the manner, and reasons of its being so very Instrumental, I can't be so perfectly of his Mind.

Mr Cow-
per's Hy-
pothesis.

The Heart (says this accurate Anatomist) *of an Animal bears a great Analogy to the Pendulums of those Artificial Automata, Clocks, and Watches, whilst its Motion is performed like that of other Muscles, the Blood doing the Office of a Pondus.*

By

By the *Blood's* doing the Office of a *Pon-*
dus, I suppose he means, that the Blood
 contributes in the same manner to the Mo-
 tion of the Heart, as the *Weights* do to that
 of the *Pendulum* of a *Clock*. If so, the
 Blood, according to him, must be the In-
 strument of *Constriction*; and *Dilatation*
 must be the *Natural State*, or *Spontaneous*
Motion, to which it wou'd, when under
 no Violence, return; the contrary of which,
 I presume, will appear e're I have done.

Mr Cow-
 per's Pon-
 dus consti-
 der'd.

But if he means, that the *Blood* in its re-
 flux, by *gravitating* on the *Auricles* and
Ventricles, dilates and expands 'em, acting
 therein as a *Counterpoise* to its contraction
 as a Muscle, I cou'd wish his design had
 not bound him up to so narrow a com-
 pass, and that he had given us an Explica-
 tion at large of so abstruse and so important
 a *Phænomenon*. Because the *Specifick Gra-*
vity of the Blood seems to me a Cause by
 no means alone adequate to the Effect, which
 it is here suppos'd to produce.

For, if the Blood acts only as a *Weight*
 by meer *Gravitation*, then that part of it
 only which descends from the Part above
 the Heart can be employ'd in that Acti-
 on. This at the largest computation can't
 amount to five Pound Weight, and must,
 according to the computation of *Borellus*,
 force a Machine, that is able to overcome

Weight of
 the De-
 scending
 Blood.

a resistance of 135,000 *l*. I leave every Man to deduct what he shall upon examination find reasonably to be deducted, and yet shall rest secure, that it is not to be affected in the least with so small a Weight.

Meer Gra-
vitation
of the Re-
fluent
Blood not
sufficient.

But neither does the *Refluent* Blood gravitate in any such proportion, as I have here assign'd. For to make a true estimate of its *Gravitation*, we must consider the circumstances of the Liquor suppos'd to gravitate; in which it very much resembles Water inclos'd in a recurve Tube, of which, if the length of the two Legs be equal, it may be suspended in the Air full of Water, with the Extremities downwards, without losing a drop, altho' the *Diameter* of those Legs shou'd be very unequal. The Case of the Arteries and Veins is pretty near a Parallel to a Tube, so fill'd and inverted. For, if the Arteries and Veins be continued Tubes, (as by the Microscope they seem to appear) then supposing their contents to have no other determination of Motion, than their Weight wou'd give 'em, the contain'd Fluids must be counterpoises to each other. For the Veins and Arteries being join'd at the smaller Extremities, and the larger of both terminating in the same Parallel Line, it is impossible, according to the Laws of *Hydrostatics*, that the contents

of

of either shou'd over-balance t'other. How far then must it fall short of forcing the natural Power and Resistance of so strong a Muscle as the Heart, by meer Gravitation.

The Blood indeed has a *Progressive Motion* thro' its Vessels, wherein it differs from Water, in a recurve Tube, in the Experiment above stated. But, if the natural Gravitation of the Blood contributes nothing to the Dilatation of the Heart, this *Progressive Motion* will not be found much more sufficient. For, as this Motion is deriv'd entirely from the Heart's Constriction (as all accounts hitherto derive it) cou'd the Blood be suppos'd to re-act upon the Heart, with all the force first impress'd upon it by the Heart, it wou'd be insufficient, unless we will suppose the *Force communicated* to be superiour to the *Power communicant*, which is absurd.

*Nor the
Progressive
or
Circulatory
Motion simply
consider'd.*

But when the just and necessary Deductions for the Impediments, which the Blood meets with in its Progress thro' the Vessels, shall be made, the remaining Force will be found so exceeding weak, that to propell the Blood thro' the Veins may be a Task alone too great for so small a Power, without charging it with the additional difficulty of forcing the *Muscle* of the *Heart*.

We find it so far from equal to such a Task, that, were it not for the *Valves*, which are placed in the *Trunks* of the *Veins*, the *Weight* alone wou'd probably be too great for the *Impulse*, and the *Blood* never arrive at the *Heart*.

Disparity
between
the Force
of the
Heart and
the Resist-
ance it
meets with
according
to the Cal-
culation of
Alphon-
sus Borel-
lus.

Alphonsus Borellus, after a great deal of solemn Pains taken to shew his Care and Exactness, and to possess his Reader of the Truth of his Calculations, casts up the Force of the Heart, and the *Muscular Coat* of the Arteries, to be together equal to a Weight of 3,750 *l.* and allots 'em a Resistance equal to 180,000 *l.* to overcome which is 45 to 1. To make up for a disproportion, by his own Confession, incredible to those who have not consider'd the matter as he had done, he flings into the Scale the additional *Force of Percussion*, which he leaves *indefinite*, and thinks sufficient to force any *quiescent finite Resistance* whatsoever.

But as this Account and *Hypothesis* are part of a Posthumous Work (if a liberty of Conjecture may be allow'd in so uncertain a matter,) I shou'd suspect, that these Papers were left unfinished by *Borellus*; or at least, that in many Places the last Hand was never put to 'em. For, neither in this Place, nor any other of this Work, does he account for any more than the *Systole* of the Heart, and the resistance which is made

to

to the Progressive Motion of the Blood in the Arteries only. This alone he found to exceed the Power of the Heart so prodigiously, that he seems to shuffle it off his Hands with a general and precarious Solution, as a difficulty that he was desirous to be rid of. For, having ascrib'd this *Stupendous* (as he himself calls it) effect to the *Energy of Percussion*, he takes no care to satisfy his Reader any farther about it, or to refer him, or give him the expectation of satisfaction any where else; altho' he has an express Treatise on the *Force of Percussion*, which was written preparatory to this, and to which he frequently refers in other Places of this Work. But what confirms my suspicion, that this Part was intended for a farther Revise by the Author, is, that he has left the Progress of the Blood thro' the Veins, and the *Diastole* of the Heart, absolutely untouch'd, tho' they are difficulties of a much greater Magnitude, than this which he has attempted to account so slightly for. For in these he is excluded the benefit of *Percussion*, and has yet a greater resistance to overcome without it. Omissions of this kind are so unusual with this Author, where-ever he knows himself to go upon sure Grounds, that it is to me an Argument, that he doubted the sufficiency of his *Percussion*, and reserv'd these important *Phænomena* for farther Consideration,

*Diastole
untouch'd
by Borel-
lus.*

sideration, without plunging himself into such an Absurdity as to ascribe to *Percussion* any such *Energy* as to be able (so broken as it returns to the Heart) by its re-Action to force that Power, from whence only it was first deriv'd.

Dr *Lower* and Mr *Comper* deliver their Opinions of the Cause of the Dilatation of the Heart so very short, and without any Arguments to support 'em, that by exposing 'em naked, they seem rather to Discourse of it transiently, as Men obliged by the nature of their Subjects to say something of it, than solicitous to give any full or satisfactory Account, and therefore I shall proceed no farther upon 'em here.

But tho' the *Hypothesis* of *Borellus* may in this Case be found precarious or insufficient, (a misfortune that has befallen him in divers other Particulars) his *Theory* holds good still. At least it ought to be allowed in justice to his great Abilities and Exactness, till some Body convicts him of some material Error in his Calculations, which has not as yet been done by any Body, that I know of.

Supposing then the Force of the Heart, and of the *Muscular* Coat of the Arteries, as likewise of the resistance, which they must overcome, to be computed with any degree of accuracy, there remains yet such a prodigious disproportion to be accounted for,

for, as requires some more powerful Agent, than any yet assign'd, to make up the deficiency.

What assistance the Heart receives from the action of the *Thorax* towards the facilitating its Contraction, without which assistance there cou'd have been no *Systole*, has been already shewn. But neither the *Intercostal* Muscles, or *Diaphragm*, which are so instrumental in that part of its Action, can contribute any thing to the *Diastrale*; because they serve only to enlarge the cavity of the *Thorax*, and thereby to open a Passage to the Blood from the Heart, and promote its Constriction.

Whatever therefore the Force is, that dilates the Heart, and is the Cause of the *Diastrale*, it must be equal to that of the Heart, the *Intercostal* Muscles and *Diaphragm*; to all which it acts as an Antagonist. I take no notice of the *Serratus Major Anticus*, and other Muscles, which have an obscure share in the *Elevation* of the *Costæ*, because as much may reasonably be deducted upon the account of the *Obliquus externus Abdominis*, and other Muscles; which, having their insertions on some of the lower *Ribs*, are as instrumental towards the *Depression* of 'em, and so ballance the account. But the chief use of these is in violent Respiration. In ordinary Respiration their share is small.

Such

No sufficient Power
within the
Body.

Such a real Power (which may in the least be suspected of any share in this Action) is hard, perhaps impossible to be found in the *Machine* of an *Animal* Body; and yet without some such Antagonist, it is impossible the Circulation of the Blood shou'd be maintain'd. All the Engines yet discover'd within the Body conspire towards the *Constriction* of the Heart, which is the *State* of *Quiescence*, to which it naturally tends. Yet we find it alternately in a *State* of *Violence*, that is, of *Dilatation* and this upon necessity, because upon the *Alternation* depends all *Animal* Life.

The Counterpoise
External.

Some sufficient external Cause must therefore be found, to produce this great Phenomenon, which Cause must be either in the *Air*, or *Atmosphere*, because we have no constant and immediate Commerce with any other *Media*.

Some great Physicians observing this, and that depriv'd by whatsoever Means of Communication with the *external* Air, we became instantly extinct, have imagin'd, that in the Act of Inspiration certain purer Parts of the Air mixed with the Blood in the Lungs, and were convey'd with it to the Heart, where they nourish'd a sort of *Vital Flame*, which was the Cause of this reciprocal *Æstus* of the Heart. Others not quite so gross, rejecting an *Actual* Flame have fancied that these fine Parts of Air mix

mixing with the Blood in the Ventricles of Heart, produc'd an *Effervescence* which dilated it. But these Fancies have been long since exploded and condemn'd upon ample Conviction, and 'tis a Point yet undetermin'd, whether any Air does mix with the Blood at all in the Lungs, or not.

But supposing that some Air may insinuate it self into the *Pulmonary Vein*, it can no other way dilate the Heart than by an Effervescence in the left Ventricle, which wou'd not dilate the Right. But this Opinion is contradicted by *Autopsie*, and too laboriously confuted by others, to be brought upon the Stage again here.

There remains therefore only the *gross Body* of the *Atmosphere* to be consider'd, which is undoubtedly the *true Antagonist* to all those Muscles, which serve for ordinary Inspiration and the Constriction of the Heart. This will appear more evidently, if we consider not only the Power, but the necessity of its Action upon *Animal Bodies*, as well as the want of other sufficient Agents.

The Heart is a *Solitary Muscle* of very great Strength, and the *Intercostal Muscles* and *Diaphragm*, which likewise have no *Antagonists*, are a vast additional Force, which must be ballanc'd by the contrary Action of some equivalent Power or other. For, tho' the Action of the *Intercostal Muscles*

Heart and Muscles of the Thorax and Diaphragm have no Antagonists in the Body.

Muscles be voluntary, that does not exempt 'em from the condition of all other Muscles serving for *voluntary* Motion, which wou'd be in a State of perpetual contraction, notwithstanding any Influence of the Will, were it not for the libration of *Antagonist* Muscles. This libration between other Muscles is answer'd by the *Weight* of the incumbent *Atmosphere*, which presses upon the *Thorax* and other Parts of the Body. And, as in all other voluntary Motions the influence of the Will only gives a Prevalence to one of two Powers before equilibrated, so here it serves to enable those Muscles to lift up a Weight too ponderous for their Strength not so assisted; and therefore as soon as that assistance is withdrawn, the *Costæ* are again depress'd by the meer *Gravitation* of the *Atmosphere*, which wou'd otherwise remain elevated thro' the natural tendency of those Muscles to contraction.

This is evidently prov'd from the *Torricellian* Experiments, and those made upon Animals in Mr. Boyle's Engine; where, as soon as the Air is withdrawn, and the pressure thereby taken off, the Intercoastal Muscles and Diaphragm are contracted, and the Ribs elevated in an Instant, and can't by any power of the Will be made to subside, till the Air is again let in to bear 'em forcibly down.

It

It were scarce worth while to take notice here of a Mistake of the Learned Dr. *Willis*. Error of Dr Willis. *lis*, were it not for the Great Authority of the Man, which is sufficient to keep that De Respirationis Organis & Usu. Error in countenance even to this very Day. The Dr. having observ'd that the Fibres of the *External* and *Internal Intercostal* Muscles ran in a contrary Order, as it were decussating each other, takes occasion from thence to fancy, that there was an opposition in their Office, and that as the *External* serv'd to raise up the Ribs, the *Internal* drew 'em down again, forgetting at that time, That, when a contractile Body is fasten'd at the several ends to Points unequally movable, let the Contraction happen in what part or manner soever, the more movable Point must be drawn towards the less movable: By which rule, whether *External* or *Internal Intercostals* be contracted, the lower Ribs will be forc'd to approach the upper, that is, be rais'd up.

As in the Elevation of the *Costæ*, the Blood, Power Antagonist to the Muscles of the Heart and Thorax. by the passage that is open'd for it, is in a manner sollicitated into the Lungs, so in the Depression of 'em, by the subsidence of the Lungs and the Contraction of the Blood-Vessels, both which are consequent thereof, the Blood is forcibly driven, as it were with an *Embolum*, thro' the Pulmonary Vein into the Left Ventricle of the Heart. And this, together with the *general Compression* of the *Body*

Body by the *Weight* of the *Atmosphere*, which surrounds and presses upon the whole Surface of it, is that Power which causes the Blood to mount in the Veins, after the force impress'd upon it by the Heart is broke and spent, and which is sufficient to force the Heart from its natural State to Dilatation.

Animal
Bodies
compressi-
ble Ma-
chines.

He that is able to compute the Weight of a Column of Air, equal to the Surface of the whole Body, will readily grant it Power sufficient for the Effects, which are here ascrib'd to it. And, when he considers, that the Bodies of Animals are compressible Machines, he will find that it must of necessity affect them in the manner here laid down. But tho' our Bodies be entirely compos'd of *Tubuli*, or Vessels fill'd with Fluids, yet this Pressure, how great soever being equal, cou'd have no effect upon 'em if the superficial Dimensions were not easily variable; because being compress'd on all parts with the same degree of Force, the contain'd Fluids cou'd not any where begin to recede, and make way for the rest to follow, but wou'd remain as fixt and immovable as if they were actually Solid. But by the Dilatation of the *Thorax*, room is made for their Fluids to move, and by the Coarctation of it, fresh motion is impress'd which is the main Spring whereby the Circulation is set and kept going.

Th

This reciprocal Dilatation and Contraction of the Superficial Dimensions of the Body seems so necessary to Animal Life, that there is not any Animal so imperfect as to want it, at least none to the inward Structure, of which our Anatomical Discoveries have yet reach'd. For, tho' most kinds of *Fish*, and *Insects*, want both *moveable* Ribs and Lungs, and consequently have no dilatable *Thorax*, yet that want is made up to 'em by an *Analogous* Mechanism, answering sufficiently the necessities of their Life.

Reciprocal Dilatation and Contraction necessary to Animal Life.

Those *Fishes*, which have no Lungs, have *Gills*, which do the Office of Lungs, receiving and expelling alternately the Water, whereby the *Blood-Vessels* suffer the same Alteration of Dimensions, that they do in the Lungs of more perfect Animals.

Respiration of Fishes.

The Lungs or *Air Vessels* of *Insects* are yet exceedingly more different in Structure, Distribution and Situation from those of perfect Animals, than those of *Fishes* are, and yet in their Use and Action agree perfectly with both, that is, *removing* and *expelling* the Air, and *varying* the *Dimensions* and *Capacities* of the *Blood-Vessels*. These having no *Thorax*, or separate Cavity for the Heart and Air Vessels, have the latter distributed thro' the whole Trunk of their Bodies, by which they communicate with the

the *External* Air thro' several *Spiracula* or *Vent Holes*, to which are fasten'd so many little *Tracheæ*, or Wind-pipes, which thence send their Branches to all the Muscles, and *Viscera*, and seem to accompany the Blood Vessels all over the Body, as they do in the Lungs only of Perfect Animals. By this Disposition in every *Inspiration*, the whole Body of these little Animals is inflated, and in every *expiration* compress'd, and consequently the Blood-Vessels must suffer a *variety* of Extension and Contraction, and a greater motion must thereby be impress'd upon the Fluids contain'd in 'em, than the Heart, which does not in these Creatures appear to be Muscular, seems capable of giving.

The only Animal that is exempted from this necessary condition of *Breathing*, or *receiving* and *expelling* alternately some fluid into and out of the Body, is a *Fetus*. But this, while included in the Womb, has little more than a *vegetative* Life, and ought scarce to be reckon'd among the number of *Animals*. For, were it not for that small share of *Muscular* Motion, which it exercises in the Womb, it might without absurdity be accounted for as a Graft upon, or Branch of the Mother.

Cor

Concerning the immediate matter, and means of Life, and Nutrition, Authors are not agreed, nor is it the business of this place to reconcile, or decide their differences, but to account for the motion of the Blood through the Vessels only. In order to this, it will be necessary to observe, that the Pulsation of the Heart in a *Fœtus* is so very weak and obscure, and the motion of the Blood so extream slow and languid, as to be scarce, if at all, perceivable, as has been experienc'd in the Dissection of Puppies before Respiration had. To produce such a feeble Palpitation, and creeping Motion, no greater force seems to be requir'd than may be deriv'd from the Communication between the Vessels of the Mother and *Fœtus* in the *Placenta*. I am not Ignorant, that divers very Learned Anatomists (whom the Crowd have implicitly follow'd) have absolutely rejected all Communication between these Vessels. But, with submission to great Authorities, I think they have acted arbitrarily, and without sufficient Warrant from Reason or Experiment. For neither are the Arguments which they bring against it conclusive, nor the Office which they assign to the Umbilical Vessels in lieu of it, proper, or natural to those Vessels, or the reality of the Fact made out by any substantial Reasons. Those that reject this Communication usually do it in favour of

Circulation in the Fœtus, maintained by impulse from the Mother.

Boyle of the *Elasticity of Air*.
Pecklinus de *Aeris & alimentii defectu*.

Objections considered.

one or both of these Opinions, that the Arteries of the *Uterus* do deposite a Nutritive Juice, or a Juice impregnate with Air in the *Placenta*, which is suck'd in by the *Umbilical Vein*, and convey'd to the *Fætus*, for the necessary Uses of Nutrition and Life. Now those that patronize either of these Opinions lead Nature an unnecessary dance. For if the *Maternal Blood* does really contain any such *Nutritious*, or any such necessary *Aerial Particles*, why should they be separated and extravasated, to be with difficulty receiv'd into the *Umbilical Vein* and again mixt with the Blood, when they might more easily have been imparted by the plain simple way of Transfusion from the Arteries of the *Mother* to the Veins of the *Fætus*? And, that this is the course which Nature takes in this case I am perswaded from the easiness and simplicity of the Method, which readily performs what might be perhaps in vain expected from t'other, and wou'd over and above find 'em, what they seem to grow so blindly about for, a first Mover of the Blood in a *Fætus*.

Objections
against
Nutriti-
on by the
Umbili-
cal Vein.

Those that contend for the conveyance of a *Nutritious Juice*, through the *Umbilical Vein* from the *Placenta*, are forc'd up to two difficulties next to Absurdities. First, they are oblig'd to make this Vein, which, as all other Veins, seems dedica-

to the re-conveyance of Blood only, the proper and immediate Channel, through which a very different Liquor is to be carried; and next to give a Power of Attraction or Suction to it; because the *Nutritious* Juice, which it is thus destin'd to carry is both Viscous and Stagnant, and has neither force to drive, nor subtilty to penetrate, or insinuate it self into the Capillary Veins; and therefore must be drawn or suckt as *Milk* is from the *Breast*, to which the *Placenta* and its *Nutritious* Juice are by the favourers of 'em expresly compared. But if this were the sole use of the *Placenta*, and *Umbilical* Vessels, why were the *Umbilical Arteries* sent along with the Vein? Their business is not to bring any thing back to the *Fætus*, nor can they contribute any thing to the benefit of the *Mother*; for the *Uterine* Arteries bring all to the *Placenta*, the *Umbilical* Vein carries it to the *Fætus*, and the *Uterine* Veins convey back again the Surcharge of the *Mother's* Blood; the *Umbilical Arteries* only, have nothing to do, and are superfluous and impertinent, which is contrary to the constant practice of Nature. Yet if *Autopsie* did in the least countenance this Hypothesis, some defence might still be made; but we find in the *Umbilical Vein* of a *Fætus* nothing but *Florid* Blood, such as in all probability it received immediately from the

Arteries of the *Mother* without any mixture. And therefore I can't help concluding, that this opinion engages its favourers in some Absurdity, without Necessity and without Proof.

Fœtus
not suppli-
ed with
Air from
the Pla-
centa.

They that from the *Placenta* supply the Body of the *Fœtus* with *Air*, are as much distress'd as t'other, for they are forc'd to beg the Question twice, which, even when granted, will not answer their ends. First, they suppose, that an intimate mixture or confusion of *Air* with the *Blood*, is necessary for the support of Animal Life, a *Postulatum*, which perhaps the former part of this Discourse may have render'd unnecessary; and next that the *Fœtus* is supplied with *Air* from, and its *Blood* mixt with it in the *Placenta*.

But here again they fetch a Compass without necessity or proof. For if a mixture of *Air* were necessary to a *Fœtus*, why should it be separated from the *Mother's* *Blood*, and not rather both communicated together, since it is so much more easy and commodious? But neither does the *Placenta* seem to be instructed and provided for the separation of *Air*, but of a much grosser Fluid, destin'd to some other use which *Autopsie* confirms. Yet were both these opinions true, they are however defective, and the Circular Motion of the *Blood* unprovided for.

By the way of *Transfusion* this great Phenomenon is naturally accounted for, and the ends, for which the other two Hypotheses were devis'd, might both be answered with more ease. For the *Hysteric* Arteries transmitting their Blood immediately to the *Umbilical Vein*, may very easily transmit such *Nutritious Juices* or *Aerial Particles* as are contain'd in the Blood, along with it, without depositing 'em by the way. By this means so much of the Impulse of the Mothers Blood is preserv'd, as suffices to maintain that languid Circulation, which a *Fœtus* enjoys. For the Blood being driven through the *Arteries* of the *Uterus* into the *Umbilical Vein*, is conveyed directly to the *Sinus* of the *Porta*, and thence by a short and direct passage through the *Cava* to the Heart; where passing through the *Foramen Ovale* to the *Left Ventricle*, and through the *Canalis Arteriosus* from the *Right* and *Pulmonary Artery*, it is all deliver'd without coming at the *Lungs*, to the *Aorta*, and from thence again by the *Umbilical Arteries* to the *Veins* of the *Uterus*, making a sort of *Epicycle* to the main Circulation in the Mother.

Transfusion from the Mother to the Fœtus.

As this Opinion is favour'd by the structure and disposition of the Blood Vessels on both parts, so there is nothing in it difficult to be conceiv'd, or repugnant to

Arteries and Veins probably continued Tubes.

experience. Late Discoveries have made it appear, that the Arteries and Veins are continued Tubes, and that the latter contain nothing but what they receive from the former, and no reason appears why we shou'd think this Method to be varied in the *Placenta*. On the other hand, if the Arteries of the *Uterus* were continued to the Veins of the *same* part, and those of the *Fætus* in like manner, without communicating with each other, their confluence in the *Placenta* seems to be altogether impertinent and of no use, and the *Umbilical* Arteries and Vein fram'd for no other service or purpose, than to give the Blood room for an idle Sally.

Mr. Cow-
per's Ex-
periment.

Thus the reasonableness of this old Opinion may be vindicated, but the certainty of it rests upon stronger proof. Mr. *Cowper* to whose happy Industry we owe the Confirmation of many Antient Discoveries, and the benefit of some new ones, has the Honour to re-establish this Old, but long exploded Truth. For by pouring *Mercury* into a Branch of the *Uterine Artery* of a Cow that went into one of the *Cotyledones* of the *Uterus*, he fill'd those Branches of the *Umbilical* Veins, which went from that *Cotyledon* to the *Navel* of the *Fætus*; which with a part of the *Uterus* he keeps prepar'd for him.

It would be a weak Objection, to allege that the Observation and Experiment being made on the *Uterus* of a *Cow*, the inference wou'd not hold from thence to a *Woman*, the one being *Glanduliferous*, and the other *Placentiferous*; since every one of these *Cotyledones*, or *Uterine Glandules*, is in all respects a little *Placenta*, and all the difference between 'em is in number, name, and magnitude. Why *Ruminants* differ in this particular from other *Viviparous* Animals, is beside the subject of our present Enquiry. But the great Flux of Blood which constantly follows upon drawing the *Placenta* from *Women* (which is frequently so great as to cost 'em their Lives) is as plain a demonstration to Reason of the *Continuity* of the Vessels, as Mr. *Cowper's* Experiment to the Eye.

I have heard it objected by very Learn- objections
ed Men, that if there were such a *Conti-* Answer'd.
nuity of Vessels, and such *Transfusion* of Blood, the *Fætus* must necessarily perish through loss of Blood, upon the separation of the *Placenta* from the *Uterus*, but that on the contrary no considerable flux of Blood does follow while the *Fætus* continues wrapt in the Membrane, in which condition it may be kept alive some Hours. To this it may be answer'd, that the Circulation in the *Fætus* being deriv'd from the Mother, may be suppos'd wholly to

cease upon the cutting off the communication between 'em, till it is again renew'd more forcibly by *Respiration*. But if we allow the Motion already impress'd upon the Blood to be sufficient to keep it going a little while, yet it must needs be so exceeding languid, that the meer resistance of the external Air must be more than enough to hinder any Efflux of Blood from a *Fœtus* before *Respiration*. How long Life may be preserv'd without an *actual* Circulation of the Blood, is a Question not of this place. But we have been convinc'd by many and notorious Observations and Experiments, that Life has been recover'd a long time after all Tokens of *Respiration*, Circulation, or even Life it self have disappear'd, so that we can't think the first Solution either impossible or improbable.

Want of
Conti-
nuity be-
fore Ad-
hæſion.

I expect to be told, that in the early Days of *Gestation* in *Viviparous* Animals there is no *Placenta*, or any Adhæſion of the *Umbilical* Vessels to any part of the *Mother*, and consequently no such *Transfusion*; and that in *Oviparous* there is no *Continuity*, or *Communication* of Vessels of any kind, during the whole time of *Incubation*.

Accounted
for.

But these Objections carry neither the Weight nor Difficulty along with 'em, that they may be suppos'd to do; for in those days there is neither *Blood* nor *Blood Vessels*, and consequently there can be no Circulation

tion

tion of the Blood; and the *Embryo*, of what Species soever, is no more than a *Vegetable* at that time; nor does the *Fætus* of any *Viviparous* Creature enjoy any *Circulation*, or shew any signs of *Animal Life*, till after those *Vessels*, as well as others requisite to the *Circulation*, are compleated.

It must be confess'd, that *Oviparous* And in Oviparous Animals. Animals are denied the Benefit of this Communication: But that want is sufficiently compensated by a peculiar Mechanism, which directly answers the ends of *Respiration*, and the *Pressure* of the *Atmosphere* upon the *Fætus*. There is at the *Obtuse* end of an Egg a small Cavity fill'd with Air, which is the *Succedaneous Instrument* to the *Respiratory Organs*. For as soon as the Contents begin to be warm'd by the *Incubation* of the Hen, or any *Analogous Heat* of *Furnace* or *Dunghil*, the several Humours of the Egg acquire a *Fermentative Motion*, and the Air contain'd in the Cavity Use of the Cavity at the Obtuse End of an Egg. or *Vesicle* at the *obtuse* end of the Egg is rarified, and the *Vesicle* extended and enlarg'd, and consequently the other contents are compress'd, which the *Fermentative Motion* naturally resists. But both Bodies being as well *compressible* as *dilatable*, and both having an *Expansive Motion* impress'd upon 'em by *Incubation*, the compression and renitency will be mutual; but varied in

in degree, according as either, through the variation of Circumstances, shall prevail. By this means, an Alternation of Compression and Dilatation will be produc'd in both answering the *Respiratory* Motion, by which a Motion will be communicated, which, as soon as the Organs (by which it shou'd be regulated) are compleated, will in the Body of the *Pullus* be *Regular* and *Circulatory*.

Mistaken
by Fabri-
tius, &c.

Fabritius ab *Aquapendente*, and after him our Great Dr. *Harvey*, have assign'd diverse uses to this Cavity or Air-Vesicle, the Extravagance of which have perhaps deterr'd others from enquiring so much into the Use, as the importance of it requir'd. But tho' I cannot agree to that *Perpiration*, *Refrigeration*, and *Respiration*, which they make it the Instrument of, yet perhaps the *Air*, that was inclos'd in that Cavity, may through the augmentation of the Body of the *Pullus*, and its own *Rarefaction* (which is at last so great as to occupy half the Shell) break the *Membrane*, which separated it from the *Pullus*, and thereby give so much *Respiration* as to form the chirping Voice, which is often heard before the breaking of the Shell, and with it give an Addition of Strength to enable it to break the Shell. But how it shou'd respire sooner 'tis to me inconceivable.

There are many Problems of great seeming difficulty, the Solutions of which flow
nati

naturally from what has been laid down here: But intending to prosecute this Subject farther, and to treat of the Impediments of Respiration, and the consequences of Respiration obstructed or intermitted, in a *Treatise* expressly on that Subject, I shall reserve 'em for that opportunity, and content my self here to attempt the *Harveyan Problem* only, which has given abundance of Authors so much perplexity.

That incomparable Philosopher enquires, *Why a Fœtus, taken out of the Uterus with the Membranes entire, shall live in Water some Hours without Communication with the External Air? whereas if it be taken out and suffer'd once to breath, it can't afterwards survive a Moment without the Benefit of Respiration.* Harvey-
an Prob-
lem.

Granting the Fact to be as he has delivered'd it, which yet is not so in all Cases, the main difficulty is grounded on a Mistake, which from the stating of the Question I find this Great Man to have slippt into. For he thinks, that a *Fœtus* is sooner suffocated after having once breath'd, than if it had not breath'd at all, and that by breathing it had contracted something which render'd it more perishable. *Idem tamen* Attempted
secundis exutus, (says he) si semel aerem intra Pulmones attraxerit, postea ne momentum quidem temporis absq; eo durare possit, sed festim moriatur? And presently after, *Siquidem constat, fœtum, postquam eum semel*
hauserit,

Harv. de
Gen. Anim
Cap. de
Partis.

hauserit, citius suffocari; quam cum ab illo prorsus arceatur. The Dr. observing a *Fœtus* to live longer without Respiration, and to dispenſe better with the want of Air while included in the Membranes entire, than it cou'd afterwards; infers thence, that the Air does in the first Act of Inspiration impress upon the Lungs some quality, which renders it ever after more indispensably necessary. But allowing his Observation, I must yet deny his Inference to be good: For, deprive a *Fœtus* of means of respiring, and then take it out of the Membranes, and it shall be as soon suffocated, as if it had respired before. This proves, that this Necessity of intercourse with the Air by way of the Lungs is not the Offspring, but the Parent of Respiration, and that, that Learned Man was drawn into a Fallacy of *Non causa pro causa*.

Necessity
of Respi-
ration af-
ter Birth,
whence.

The reason of this Necessity is the pressure of the External Air upon the Surface of the Body, from which it was defended by the interposition of the Membranes and the Humours contain'd, which are not so compressible, as the Body of the *Fœtus* it self. So soon therefore as the *Fœtus* is excluded, and expos'd to the immediate contact of the ambient Atmosphere, the Vessels and all the Cavities of the Body must necessarily be so compress'd, that the Fluids can't have room for Motion, and consequently the *Fœtus* triv'd

could have no Life, if Nature had not contriv'd by the Motion of the *Thorax* to remove and admit that pressure alternately, and thereby to impress a Motion on the Fluids, which is the Spring of Life. But this Motion of the *Thorax* being any way suppress'd, the equal pressure of the Atmosphere on all parts occasions a total Cessation of Motion, which is Death.

I shall prosecute this Subject no farther now, nor trouble the Reader with any Apology, for dissenting from those great Men herein named : Because, I hope, I have done it with Modesty, and all the Respect due to so great Authorities, and have assign'd nothing which is not matter of Fact uncontroverted, or deduc'd from it by plain Mechanical Necessity.

T A B. XIII.

THE Trunk of the *Vena Pulmonalis*, with its Branches fill'd with *Wax*, separated from the *Lungs*, and display'd as in *Inspiration*.

AA, The *Bulbous* Trunk of the Vein.

B, Its Orifice ty'd up, when cut from the *Left Ventricle*, close to the Basis of the Heart.

C, The *Left Auricle* of the Heart fill'd with *Wax*.

DE, The Trunks and Branches of the *Pulmonick* Veins of the *Right* and *Left Lobes* of the *Lungs*, in which it's observable those of the right side, are larger and more numerous than those of the left.





C H A P. VIII.

Of S A N G U I F I C A T I O N and N U -
T R I T I O N.

THE BLOOD is a Warm, Red Li-
quor, circulating by means of the Ar-
teries and Veins, through every part of the
Body.

While it Circulates in the Vessels, it ap-
pears a Homogeneous, or Uniform Liquor,
but being let out, as it gradually cools, it
separates spontaneously into two distinct
parts, a *Crassamentum*, or Red Coherent
Mass, and a *Serum* or Transparent part which
still retains its Fluidity, and being some-
thing the more specifically heavy of the
two, sustains, and bears up the Red part,
which swims in it. The proportion of
which two, in the mixt, is ordinarily about
one and an half of the *Serum*, to one of the
Crassamentum. I have pitch'd upon this
Proportion as a Medium between the Ex-
cesses on both sides. But the Reader is
not to be surpriz'd, if he sometimes find
the Proportion vastly different from what
I have here given, even in Persons of sound
Health. For as to this Point, *Nature* seems
not to have settled any perfect Standard,
but the *Blood* of some will be more *Watry*
or *Serous*, of others more *Fibrous*, than
this

While Cir-
culating
an Homo-
geneous
Liquor.

Separates
when let
out into
Serum
and Cras-
samen-
tum.

Proportion
not abso-
lutely de-
terminable

this Proportion seems to allow, and yet no visible difference be found in the Performance as to point of Health. And therefore propose this as a Measure of a thing not reduc'd to a certainty, and in which therefore a great Latitude is to be allow'd.

Blood
deriv'd
from
Chyle.

The **B L O O D** is deriv'd from the *Chyle* which, having pass'd the *Lacteals* of the several kinds, is deliver'd into the *Blood* at the *Subclavian*, whence they pass together to the *Right Ventricle* of the *Heart*, and there, being yet more intimately mixt, circulate thenceforwards together through the whole Body, till after several Circulations and Depurations at the several Colatures of the Body, they are, as the *Chymists* call it, Cohobated, or Assimulated, so as to make one uniform compound Mass, which seems to be nothing else but *Chyle* alter'd by the Artifice of Nature, and exalted into *Blood*. For it does not appear that any thing Extraneous is mixt with the Liquor circulating in the *Blood Vessels*, but *Chyle*, except what was first separated from it for particular Uses, and what after having serv'd there is return'd to it. Unless, perhaps, it may receive some Portion of Air in the *Lungs* which has been a Question much agitated *Pro* and *Con*, but not yet brought to any certain Decision by any Arguments that cou'd yet see for either side of the Question.

Tha

That there is a quantity of *Air* mixt with the *Blood*, and circulating along with it, is past doubt, but whether any more than was at first contain'd in the Bodies, out of which the *Chyle* was form'd, and was then transmitted along with it to the *Blood*, is a Question not yet decided. Nor perhaps is it easie to find Arguments that shall be demonstratively conclusive either way. Tho' if Air in the Blood. if there were any *Air* introduc'd into the *Blood* by any other passage than the *Lacteals*, in the manner already mentioned, it wou'd be a Discovery of very great Importance, and that might tend to the Solution of many doubtful Problems in the Animal Oeconomy, if the Way and Method of its entrance cou'd be clearly demonstrated; but that not being done, even for the *Lungs*, (the most probable way) I shall not presume so far as absolutely either to receive, or reject the Opinion. How introduc'd uncertain, otherwise than with the Chyle.

The necessity of *Respiration*, and the florid Colour which the *Blood* receives in the *Lungs*, and first shews in the *Vena Pulmonaris*, are the Arguments, which those who contend for the admission of the *Air* into the *Blood* that way, insist most upon. For the first of 'em I have already accounted another way in Chap. VII. of this Book. The latter is chiefly supported by the Experiment of turning the Grumous Red Part of the *Blood* after Coagulation upon *Blood-letting*, by Arguments for mixture of Air with the Blood in the Lungs.

F f which

which it is observ'd that the under Surface, which was before blackish, being turn'd up and expos'd to the *Air*, acquires a florid Colour like that of the *Blood* in the *Vena Pulmonaris*, from whence they argue that this Change wrought, is in both Cases by the same means, *viz.* The Contact of the *Air*. But for this Change in the *Lungs* those that oppose the admission of the *Air* pretend to account by the extraordinary Agitation of the *Blood* in the *Lungs*, which they think sufficient by Comminution only to impart the bright Colour.

Experi-
ment in
favour of
that Opini-
on.

There is an Experiment indeed which seems to favour the real admission of *Air* which is, That keeping the *Lungs* of a Sheep or other Animal in a Pendulous Posture, Water be pour'd into the *Trachea*, till it be full, the Water will first insinuate it self into the *Air Vessels*, and thence return very freely through the *Blood Vessels*. This I have tried very often, but as I observ'd, wou'd flow as freely from the Artery as the Vein, which, together with the *Hydropical* Distention of the *Vesicles* themselves, render'd it suspected to me, that the Continuity of those very tender Parts was broken by the weight of the Water, and therefore I dare not lay too much stress upon this Experiment, but propound it only in order to farther and less suspicious Tryals.

But whencesoever deriv'd, and how little soever it may be, this included *Air* is that which gives the *Expansive Motion* or Spring to the *Mass of Blood*, and consequently is the Cause of the *Incalescence*, or *Warmth* of it, which may thence easily be accounted for without having recourse to *Acids* and *Alkalies*, or *Chymical Principles*. For *Air* (wheresoever included) is compress'd, as it must necessarily be in all Liquors, & will endeavour to expand it self, and consequently, if it be strong enough, drive outward the parts of the Body that inclose it: By which means it causes the *Blood* to beat against the sides of the *Vessels*, which having *Musculous Contractile Coats*, do in their turns compress it again, and so cause a *Reciprocal Æstus* in the *Blood* greater than the meer Circulatory Motion cou'd; whence the parts of the *Solids* or containing *Vessels*, being put into a constant Agitation, as well as the *Fluids*, a Heat is produc'd in both, which they mutually impart to each other.

*Air the
spring of
Intestine
Motion in
the Blood.*

Besides this *Air*, the *Blood* consists of several sorts of parts, to some one or more of which, and their mutual action upon one another, the *Intestine Motion* of the *Blood* has hitherto generally been imputed. Those which upon the *Analysis* offer themselves to our view, are two sorts, as *Salts*, a *Quantity of Oyl*, which by some nice Exa-

*Analysis
of the
Blood.*

mens has likewise been found to be of two forts; a great deal of *Phlegm* or *Water*; and a good Quantity of *Caput Mortuum*; which however simple it may appear, may for ought we know, consist of divers Substances essentially distinct from one another: But for want of sufficient ways of *Probation*, all that we get out of it is a little *fixt Salt* by *Incineration*.

Chymists
Account of
the Co-
lour pre-
carious.

The *Chymists*, according to their wonted Method and Principles, account for the Colour of the *Blood* from the *Exaltation* of its *Sulphur*, which whether true or false, is *Gratis Dictum*, and altogether as unsatisfactory as it is arbitrary. However since the Doctrine of Colours in general is not applicable to *Medicinal Use*, it is not an Inquiry very necessary to be prosecuted in an *Anatomical Work*.

Borellus's
Account.

However that accurate Sagacious Inquirer *Alphonsus Borellus* not satisfy'd with such wide *Vague Idea's* of Natural Causes, thought fit to examine the Ground or *Materia Substrata* of the Redness of the *Blood* by a Method more simple, and I think in such Cases more likely to succeed than the *Chymical*, which destroys the *Concrete*, and with a new *Texture* introduces new Colours and Appear-

* *De Motu Animæ* Part II. Prop. 122. * He took a parcel of the *Crassamentum*, after it had separated it self from the *Serum*, as far as spontaneously it wou'd and washing it frequently in *Water*, found

tha

that by that way it was separable into a Viscous slippery Substance consisting of *white*, or colourless *Fibres*, which rises to the Surface of the Water and there gathers into a Skim, or coherent Pellicle of a *Reticular Texture*, and deep *Red Powder*, which precipitated pretty plentifully to the bottom.

This Experiment shews, that the Red Colour of the *Blood* is imparted to the *Blood* by particular *Tinging Particles*, as in the common Experiments of *Dyers*, though not so inseparably as many of theirs, most of which they know however very well how to *discharge*. It might therefore be very well worth that Man's while, who will reason about the Colour of the *Blood* from the *Hypostatical Principles* of the *Chymists*, to examine the Red Precipitate apart, and see with which of their Elements it most abounds, which might perhaps teach 'em to be more wary in pronouncing about the Original of Colours; and with this Caution I leave it to their Inquisition.

This fine Red Colour, however generally found in the *Blood* of *Terrestrial Animals* and most others, is not absolutely necessary or essential to it. For, besides that divers whole *Species* have their Circulating Liquor *White*, or *Limpid*, which I shou'd not scruple to call *Blood*, I have seen *Blood* let out to the Quantity of a Pint or more from the *Median* of a Man, which was all of a pure *Milk White*, which did not when cold sepa-

Blood not
necessarily
Red

White
Blood.

rate into a *Crassamentum*, as the *Red* usually does, nor yield a Skin or Cream, nor turn sour upon keeping as *Milk* does, which to appearance it very much resembled, but remain'd sweet without parting Substance for some Weeks, and at last corrupted and stank after almost three Months, that kept it fluid in a Vial, and then a very slight separation ensued of the *Whiter* part, from a *Whey* colour'd *Liquor*, but neither was the *Coagulum* near so strong as that of sour *Milk*, nor the *Liquor* so transparent as *Serum* or *Whey*, nor either in *Smell* or *Taste* inclin'd to be sour, but had at last a fine pretty strong of *Putrefaction*. The Man from whom it was drawn was *lightly Cachectical*, and both his Looks and Complaints were like those of Maids not very far gone in a *Chlorosis*.

Broth instead of
Blood
voided at
the Nose
from Dr.
Lower.

Divers other Instances are to be found in Authors, of *Blood* that was not *Red*, and Dr. *Lower* in his Book *De Corde*, relates a remarkable Case of *One*, that bled so long at the *Nose*, that at last the *Broth* which he drank for his Supper, flow'd little alter'd that way, as *Blood*. But that Case of the *White Blood* above recited, being the most compleat in its kind, that I ever saw or read, a change made without any accidental Circumstances of Force, or the attendance of any extraordinary Inconveniencies; which was in a manner Habitual, and did not probably

come upon the Man in an instant, or a short time, nor vanish so ; but in all appearance had its leisurely Steps and Gradations, during part, at least, of which time the Man must live, and do all the Offices of Life, which he seem'd to do in the main as well as others, (especially as such to whom we have above compar'd his State) without what is vulgarly call'd *Blood*, I have propos'd it more at large that they who trouble themselves to reason about the essential Qualities of *Blood*, may at leisure consider wherein the defect lay.

The *Chymists* perhaps will readily tell us, that *Blood* is a Liquor more *Sulphureous* than *Milk*, and that in this *Blood* which resembled *Milk* so much, the *Sulphur* was not sufficiently exalted to give the *Red Tincture* which they derive from that Principle.

On the other Hand they who fetch the Colour from the Impregnation of the *Air* in the *Lungs*, may fancy a Defect or Obstruction of the passage of the *Air* into the *Blood* in that part, by which means it was defrauded of that Colour or Spirituosity which otherwise it shou'd have had.

Either of these Opinions may be true, but they are both unprov'd, and therefore neither to be insisted on. But there is another difficulty, which is, that this *White Blood* after it had been let out from the Vein

Colour
of the
Blood
from the
mixture of
Air un-
prov'd.

above the usual time of separation, either in *Blood* or *Milk*, did not yet follow the course of either, but still preserv'd its mixture, without parting into a *Crassamentum* and *Serum*, or into a *Coagulum* and *Whey*.

Here the *Chymists* have a fair opportunity to pretend a *Libration* or equal *Temperature* of their *Salts*; and to say that the Proportion of 'em was such that the *Alkalious* hinder'd the *Acid* from procuring a *Coagulum*, and the *Acid* prevented a speedy Corruption from the *Volatile Alkalious*, and so betwixt 'em preserv'd the State that it appear'd in, at the first letting out, longer than is usual in Liquors, that have had their due exaltation.

On the other Hand, they that hold the mixture of *Air*, with the *Blood* in the *Lungs*, may (at least with equal Reason) say, that this *Blood* not having receiv'd in the *Lungs* a Quantity of *Air* sufficient for its Perfection and Colour, contain'd yet enough to maintain it in the State of *Fluidity*, though not sufficient to bring it speedily to Putrefaction, which however it did at last after an unusual length of Time.

For my own part, who think the Colour of the *Blood* to depend upon other Circumstances, (not necessary to my purpose) than the exaltation of *Sulphur*, or the Quantity of *Air* contain'd in it, I leave it to the farther Inquiry of those whom the like Observation

vation shall furnish with better means to search into the Cause of it, than I at that time had.

But to return to the History of laudable well-constituted *Blood*, the *visible Elements* of it are those which the *Laboratories* of the *Chymists* produce separate, tho' perhaps much alter'd by the *Furnace*. For it is past all Controversie that the *Empyreumatical Oyls* drawn from *Blood* by *Fire*, differ, *Toto Cælo*, from the Natural *Fat*, or *Oyl*, which circulates with the *Blood*. Nor is it improbable that the *Salts* rais'd from *Blood*, or other Animal *Liquors*, are in the Operation very much acuated: Or at least that the various Combinations of 'em by which they were cicurated in the *Blood*, are so destroy'd as to render them quite a different thing from what they were in the Natural State. It may likewise be a reasonable doubt, whether that *Earth*, or *Caput Mortuum*, which remains in the Retort after the Distillation ended, be not a new Production which had no Existence under any Form resembling that in the *Blood* it self; and it is probable, that it is the Result of the heavier *Salts* and *Oyls*, which being destitute of their more Fluid parts, are in a manner Torrefy'd in the Process, and put on a *Shape*, *Consistence*, and *Rigidity*, which naturally they never had.

But

Nourish-
ment of
the Bones.

But this latter Doubt I would not extend too far, because the Nourishment of the Bones, seems necessarily to require something more *Solid* than *Oyl*, and less flux than *Salt*, which may serve to give a *Consistence*, and *Temper* to those two, of which the Bones by their *Analysis* are found mainly to consist.

Alterations
of
which the
Blood is
susceptible

From those *Principles* or *Elements*, variously combin'd and distributed by the *Circulatory Motion* impress'd by the *Heart*, as has been already shewn, Chap. VII. of this Book, and by the *Oscillatory Expansive Motion* of the interspers'd *Air*, and the Reaction, and Resilition of the Contractile Vessels thro' which it passes, flow all the Properties and Operations of the *Blood*. From this mixture of *Elements* and their lax Composition it is susceptible of various Alterations and Impressions, of which the Principal are *Coagulation*, which almost constantly attends the parts of it, when out of the Body, but if generally within the Body; must be Mortal instantaneously, and therefore such a State of the *Blood* does not appear ever to have happen'd without Artificial Procurement: *Dissolution* which is an Affection just contrary to the former, and such a *Comminution* of the Fibrous parts of the *Blood*, as indisposes it for that separation of the *Crassamentum* from the *Serous* part which always ensues in *Healthy Blood* upon cooling.

Coagulation.

Dissolution.

cooling out of the *Body*, if receiv'd into a deep Vessel. For upon a plain Surface it will not separate. This *Dissolution* or broken *Texture* of the *Blood* is often the consequence of *Malignant* and *Pestilential Fevers*, and shews it self in the *Petechia*, *Purple Spots*, and in many of these Cases the *Blood* taken away by *Plebotomy*, will not separate into a *Crassamentum* and *Serous Part*. This sort of *Dissolution* is likewise occasion'd by some kinds of *Poysons*, among which may be reckon'd the *Bites* of *Venomous Animals*, as *Rattle Snakes*, *Vipers*, &c. In some of which however the *Dissolution* is not *Total*, but *Partial*, and therefore overcome by proper *Applications*. Those two contrary *Affections* of the *Blood*, when they spring from an *Internal Course*, arise from the opposite kinds of *Salts*, *Acids*, and *Volatile Alkalies*. For tho' in an *Humane Body*, no sincere *Acid* is to be found, nor cou'd it indeed be consistent with *Life*; yet it may, and does, often enter the *Blood* so compounded, as to bridle the *Volatile Alkalious*, which is the *true Salt* of the *Blood*, and so hinder the due *Attenuation* and *Mixture* of the several *Parts*, as in the Case of a *Diabetes*, and perhaps in a *Chlorosis*, where the *Blood* is *Thick* and *Torpid*. On the other Hand where the *Alkalious* are too redundant, and unbridled, or exalted, the *Blood* is render'd

No sincere
Acid in
Humane
Blood.

too

too thin and fluid, so that the Discrimination of its Consistent Parts is lost, according to the several Degrees of which follow *Hypermenstruations, Purple Spots, Bloody Urine, Sweat, &c.*

Blood
sometimes
over Oily.

Another *Disaffection* which is very frequent in the *Blood*, is a too great abundance of *Oyls* or *Salt Particles*, by means of which the active parts of the *Blood* being too much clogg'd, the Faculties of the Body are not so Vigorously exerted, and those Parts, which shou'd be separated from the *Blood*, for peculiar *Uses*, are intangled and detain'd, where by the ends for which they are occasion'd by *Nature* to be separated, are not sufficiently answer'd, and perhaps, (which may be none of the least inconveniencie of an *over-Oily Blood*) the Solid parts, thro' and by which it passes, are too much Lubricated and Suppled, and the *Tone* of 'em thereby vitiated, and consequently their Spring relax'd, and their Action impair'd. From hence proceed that *Sluggish Inactivity* and *Drowsiness* which generally attend very *Fat* People, whose *Nerves, Membranes* and other *Tense* Parts, are relax'd by the too great Quantity of *Fat*, with which the *Blood* abounds.

Or over-
charged
with Salt.

The contrary Affection to this, is, the defect of *Oyl* in the *Blood*, which being, as it were, it's *Balsam*, lines and preserves all the Parts from being Fretted and Corroded.

graded by the *Salts*, whose *Spicula* or Edges are engag'd, and as it were sheath'd in this soft *Balsamick Matter*, and so kept from attending the Solid Parts, as they constantly do where this is wanting. This *Dyscrasy* of the *Blood* is usually attended with a general *Atrophy*, and a Fretting or Corroding of some particular Parts: Whence arise *Serous Defluxions*, *Apostemations* and *Ulcers*, &c. to which all parts of the Body are liable in such a State of the *Blood*, especially the *Lungs*, whose tender *Vesiculous Substance* is more easily annoy'd than any other, by the *Acrimony* of the *Salt Serum*. Whenever this happens, if it be not speedily corrected a *Phthisis* soon follows, in the *Acme* of which the *Lungs* become Ulcerated.

These are the principal *Dyscrasies* or Disaffections of the *Blood*, relating to its Temperature, and due Mixture. For as to its Terrestrial part, or *Element* of Earth, the Excesses or Defects of that are not so notorious, and consequently the proportion which it holds to the rest, is not so easily to be discover'd and adjusted, unless perhaps the *Cretaceous Tophi*, and *Calculous Concretions* so frequently found in *Animal Bodies*, may be said to be the Product of a redundancy of Earth in the *Blood*. But if that be so, this *Dyscrasy* does not shew it self very apparently in the *Blood*, by any thing but its Effects, neither does it afford

any

The Quantity of terrestrious Matter in the Blood not determinable.

any clear *Indications*. For those that these Cases *Physicians* have been able to find, are generally drawn from the excess and kinds of the *Salts*, which are always combin'd in great Quantity in this sort of *Concretions*, and all the Scope that they rationally drive at from their *Preservative* or *Curative Indications*, is to prevent those *Coagulations*, of which they look upon the *Salts* to be the Cause, or to dissolve 'em when but loosely form'd. For whatever farther some may pretend to in these Cases is but the vain Boastings of *Charletans* and *Empericks* who Cheat the People with their Pretences to infallible *Dissolvents* of *firmly compacted Stones*, which they impudently pretend to have done, whenever, by the ordinary means disguis'd, they happen to drive out any loose unknit Gravel, or small Stones.

All the other *Dyscrasies* of the Blood discover themselves readily enough to the Eye, the Touch, or the Taste of a diligent Judicious Inquirer. But this only betrays it self none of these ways, and is to be found out by Reasoning, and Consequences drawn from Hypothetical Causes, in which we may easily be deceiv'd, tho' there be a necessity sometimes of using them. We can easily see whether the Blood be of greater, or less Consistence, than in a State of Health it ought to be : We can see and feel

feel whether it abounds with *Serosities* or *Oyl*: And we can Taste or even feel the *Asperities* of the *Salts*: The *Earth* only which is esteem'd the grossest of all the *Hypostatical Elements* eludes all these Tryals, and leaves us to find it in its Effects.

However, as the Excesses and Defects of the other *Elements*, are the most discoverable, so are they likewise the most important, and by their various Combinations and Complications produce most of the Diseases of the Humours of the Body, and therefore the Constitution of the Blood shou'd upon all occasions of *Plebotomy* be nicely inquir'd into with more Curiosity and Exactness, than I doubt *Physicians* generally use; who ordinarily content themselves with a superficial view, or perhaps a slight Taste with the end of the Finger: Whereas they ought in many Cases to feel carefully, and examine by their Touch the Degree of Cohæsion and Tenacity in the Grumous part after separation, as well as the Smoothness and Oleosity of both parts: And if they did by frequent weighing a stated Measure, examine the Specifick Gravity of *Morbid* in different Cases, and of Sound *Blood* likewise, they might perhaps arrive at a Standard of the Quantity of *Air* contain'd in 'em, and thereby discover when the Disease proceeded from an Excess, or defect of *Air* incorporated in it. It is certain

tain that the light, loose Observations made upon *Blood* by our *Chirurgions*, and *Blood letting Apothecaries*, are very superficial and unsatisfactory, and the Judgments that they make upon 'em generally Erroneous and False for minding only the Superfice and Colour or perhaps the appearing Quantity of *Serum* they roundly pronounce it Good or Bad, Rich or Poor, without minding any other Circumstances. Thus if the Colour be Florid and Gay, they readily commend it for good *Blood*, altho' perhaps it be *Hypochondriacal* or *Flatulent*, or have in it the Rudiments and Tokens of an *Incipient Inflammation*, in both which Cases the *Blood* will be very florid, because the *Texture* of it is pretty loose and broken. But having heard that there were such things in the *Blood* as *Red Globules*, from which indeed the *French Physicians*, and *Philosophers* have upon the Score of the Figure generally deriv'd the Redness of the *Blood* (tho' according to the Doctrine of that *Incomparable Mathematician* and *Philosopher* Sir *Isaac Newton*, Red being the Colour least *Refrangible* and least *Refracted*, the *Globular* Figure, is of all others the least apt to produce that Colour as being the most *Refrangible*, they conclude the *Globules* of the *Blood* false and intire, and consequently all else well. On the other Hand, when they see the *Sizy Pellicle*, they presently cry out of Acidity, which causes

Sizy Blood
no Argu-
ment of
Acidity.

in

in their Opinion that stiff *Coagulum*. Whereas it is the Product of the direct contrary, and is only a mixture of the *Aqueous* and *Oily* part of the *Blood* by means of too much *Volatile Salt*, which by an intense Heat are inseparably incorporated, as appears by the stiff *Jellies* produc'd in the *Digestor* mentioned Chap. XIV. B. I. which both in *Colour*, *Consistence* and *Tenacity*, resembles the *Sizy Skin*, which by its appearance always on the Surface, shews it self to consist of the lightest Parts of the *Blood*. The visible Changes that happen beyond these are generally matter of surprize, not instruction to 'em, and are usually the Objects of their Wonder, not Judgment, which it is not to our present purpose to Prosecute here, it being sufficient to have given a Hint to the Judicious Inquirer, whom I pretend not so much to inform, as to excite.

There are other Disorders in the *Blood*, which do not Originally spring from any *Dyscrasy* or undue mixture of its *Elements*, but from an Alteration in the *Motion*: Such as an *Augmentation* or *Diminution* of the Degree of *Velocity* in the *Progressive Motion*: Or the same Changes in the Degree of the *Expansive*, by which Supernatural Fermentations are induc'd, or the necessary ones dampt and checkt, and the *Progress* of the *Blood* too much hurry'd, or retarded, which depend upon various Causes;

Ch. XIV.
of Di-
gestion:

Other Al-
terations
in the
Blood:

very different from one another: As sometimes on matters taken in *ab Extra*, as in *Fevers* and other Disorders occasion'd by *Surfeits*, *Debauches* or *Drugs*, sometimes by too *violent Exercises* or *catching Cold*: At other times by some latent Malignity, or Indisposition of the *Air*, from whence proceed Epidemical Diseases; and very often by some vitious peccant Humours generated in the Body it self, and reassum'd in to the *Blood*, which are too many to be enumerated here, without entring into Detail of almost all the Diseases of the *Blood*. In this sort of Disorders the *Spirits* are too often accus'd, which is so convenient shift, and so fitted to be employed on all occasions, that it is grown almost the common *Asylum* of all baffled Reasoners, who when they are puzzled, need do no more than lay the Fault upon the *Spirits*, and the difficulty is over without any trouble. For they are always at Hand to bear the Blame. But, this is explaining *Obscurum per Obscurius*, till some Body or other give us better Demonstration of their Existence, Nature and Operations, than our Ignorance and want of something to fill their Place, and stop a Gap in our Philosophy, have done.

Ataxy of
the Spi-
rits, a
groundless
precarious
shift.

The Solids pro-
mote the
Circula-
tion.

The *Solids* likewise have their share in the disorderly Motions of the *Blood*, for according as the Tone of the respective parts, thro' which the Fluids pass, is over-

tem-

tense, or too *lax*, the Motion of the Humors will be promoted or retarded thereby. For in case of *over-tension* of the *Vessels*, the Pressure of the *Fluids* will by the *Resilition* or *Elastick* return of their *Parietes* be reverberated with greater Strength, and consequently a greater Motion will be thereby impress'd upon 'em, and the Celerity of it increas'd in Proportion. But, in a Relaxation or *Atonia* of the same Vessels, the Expansion of the *Fluids*, towards which they have a perpetual tendency from Causes already mentioned, will necessarily be greater from the yielding of the Vessels, but the Progressive will lose some of its Celerity for want of the Repercussion of their sides upon the *Fluids*, as it does in the Veins; which Resolution of the *Tone* of the *Solids* may be one Cause of those Symptoms, which constantly attend *Epilepsies*, and other *Spasmodic* Distempers.

The *Blood*, thus variously compounded, and circumstantiated, visits even the Minute-^{Nutriti-} Part of the Body, by means of the Circulative Motion: Of the Impulse and Causes of which, and the passages thro' which it is perform'd, an Account has been already given, which needs no Repetition here. ^{on, whence}

In this Round, those Particles of the *Blood* which conform best to the Figure, and Structure of the Parts thro' which they pass, are apposited to 'em either for their Aug-

mentation, which is call'd *Accretion*: Or for the Reparation of such, as by the Constancy and Rapidity of the Circulatory Motion of the *Blood* must needs be worn off from 'em.

*Contested
by Au-
thors.*

About the matter from whence this Nourishment is deriv'd, great Contests have arisen among *Physicians* and *Anatomists*, in which this only has been a Point agreed upon by common consent, that among the various Humours of the Body there was one peculiar destin'd and contriv'd for that Office, but which that is, has been the Dispute. In which, if I may have leave to speak so freely of great Authors, they have in my Opinion, shewn more Reading, Learning, and Subtilty, than true Understanding of the Point in Question.

*Various
Hypo-
theses.*

Some have contended for a *Nutritious Juice* to be convey'd thro' the Nerves, in which some great Men of our own Country have been the principal Misleaders: Some have set up the *Lymph*; Others the *Chyle*, as the *Universal Succus alibilis*: Some have appointed the *Serum* or *Albumen* of the *Blood*, (which to intimate it once for all, I take to be the same thing with the *Lymph*) for that Office, which others assign to the *Craffamentum*. And there are some who out of several Elementary parts of each, or all these, make various Combinations according to their own Fancies, from whence they have form'd

form'd an almost innumerable variety of *Hypotheses*. All of 'em carrying seeming Probability, yet none of 'em Conviction, at least not to me. The Reason of this Miscarriage of so many great Wits, seems not to be any want in them of Qualifications sufficient for such Inquiries, but that the Matter is in its own Nature not precisely determinable.

However all these (except they who bring a Nutritious thro' the *Nerves*) agree that the *Blood* is the Vehicle, that conveys the *Alimentary Parts*, thro' all the Body, whatsoever they may be, and whencesoever deriv'd. But perhaps upon the Score of its *Heterogeneity* or Composition of different *Elements*, they did not make that it self the *Nutritious Fluid* without restraining the Faculty of Nourishing to some particular parts of it, as thinking the general Account too *vague* and indefinite. I must confess my self of another Mind, and own, that I think all those precise Determinations to be too narrow and restrain'd, and that the *Blood* in its largest acceptation (including all those parts which have been before describ'd as belonging to it) is simple and homogeneous enough for the purpose of *Nutrition*.

Blood
commonly
agreed to
be the Vehi-
cle of Nu-
tritious
Particles.

I conceive therefore that all the specifical-ly different parts (be they more, or fewer than those we have already describ'd) which

No parti-
cular Nu-
tritious
Juice.

Circulate together in the Vessels under the common Name of *Blood*, do contribute something either Instrumentally or Materially to the Augmentation or Reparation of the Parts thro' which they pass : But how much each precisely for its share does separately contribute, I do not pretend to know : Nor indeed to be able to say, that the Liquor, which we call *Blood*, consists precisely and exactly of so many *Elements*, or Parts simple, as to Sense, and our *Analysis*, and no more.

Sanguification.

Therefore before I proceed to lay down my own Notion of *Nutrition*, it will be necessary to say something concerning *Sanguification*, another Point which has been very much Canvas'd among the Learned, but in my Opinion with as little Fruit and Satisfaction as the former. I shall not therefore trouble my self, nor the Reader with the *Discussion* of such *Steril Questions*, as whether the Liver, the Heart, or the Blood, &c. *Sanguifie*, which serve rather to try the Wit and Invention of Young Students, than to inform their Judgments.

What understood by it.

By *Sanguification* is generally understood the *Assimilation* of the *Chyle* into *Blood* which is suppos'd to be compleat, when the whole Circulating Mass is Saturated with a *high Red Colour*, and upon *Plebotomy* separates in the Basin into a *Red Crassamentum*, and an *Amber Colour'd Serum* only without

without any *White Matter* floating loose on the Surface, as the *Chyle* before perfect Assimilation will do.

The Physicians of the last Century, upon the Introduction and Reception of *Chymistry*, suspecting almost every thing in a Humane Body to be done by *Ferments*, and among the rest *Sanguification*, were therefore very Solicitous to circumscribe and fix it to the proper *Officina*, where they suppos'd this Ferment was prepar'd, or at least to be found; and great Disputes there were among 'em about it. Hence the *Liver* and the *Spleen* had sometimes their *Triumphs*, sometimes their *Obsequies* Sang, as a fresh Champion or Adversary arose for or against their Cause. But having, as I conceive, already destroy'd the Notion of such sorts of Ferments, I shall not trouble the Reader with any thing more particular about them, or these *Topical Sanguifications*. Neither shall I disturb the Ashes of the *Plastick Powers* and *Faculties* of the *Ancients* long since Deceas'd, since no Body is in danger of reviving those Doctrines again with any Prospect of Success.

Of *Sanguification* we may admit two Degrees, the first of which amounts to no more than a *Confusion*, or such an intimate mixture of Parts, as suffices so to confound the different colour'd Liquors, as that the Whiteness of the *Chyle* shall be so lost, or

Vain Disputes about the Parts Sanguifying.

Sanguification Gradual.

First Degree.

drown'd in the Red Colour of the *Blood*, as never more to appear again in its own Shape and Colour, to which, how many Circulations are necessary, is hard to determine. However he that considers the several Motions, as well *Intestine* as *Progressive*, will easily allow them sufficient to produce such a mixture in no long time.

*Second
Degree.*

The Second Degree of *Sanguification*, is when the parts of the *Chyle* are so exalted or communicated and subtiliz'd, as to lose intirely their former tendency to a *Coagulatory Separation*, such as in *Chyle* and *Milk* they have; in the Spontaneous Separation, or Curdling of which latter, there is a Concurrence of a manifest *Acid*, which in the Separation of the parts of *Blood* is never found, not even in the most *Morbid Case*, that ever I cou'd hear of.

*Why two
Degrees
only men-
tion'd.*

I have mentioned but two *Stages* or *Degrees* of *Sanguification*: One while the mixture is gross and confus'd only, and the other, when the Parts are communicated and united, which seems to give us a sufficient *Idea* of perfect *Blood*, tho' there may be, and undoubtedly are, several steps or degrees between these, which we neither need, nor indeed can distinguish by any sufficient Tokens, for want of knowing how many Circulations are necessary to make a perceptible Alteration in the Aggregate Mass. However there is a farther degree

in

in which the parts are yet more exalted and subtiliz'd: But this being beyond what is Salutary, I account the *Sanguification* perfect without it. This latter is that State in which the *Fibres* and *Filaments* of the *Blood* are so broken and blended with the *Aqueous* parts, as not to be again separable from 'em, which therefore I esteem a *Morbid Sanguification*, such as happens in *Pestilential* and other *Fevers*, which are attended with *Bloody Sweat*, *Urine*, *Spots*, &c. and in which the *Blood* will not separate when cool, tho' out of the Body.

All these *Degrees*, whether *Imperfect*, *Perfect* or *Morbid*, are procur'd by reiterated *Circulations*, in which, as well the *Intestine* as *Progressive* Motion conspires to the effecting the Mixture and Comminution of the Adventitious Parts, and undoubtedly have their Stated Period, in which they arrive at Perfection, tho' where precisely to fix that is unknown to us. But that it is so is plain by the Crudity of the *Chyle*, which may be found by letting Blood after a full Meal, in which the *Chyle* will appear distinct after many repeated *Circulations*, and by the too great Fluidity or over-intimate mixture which appears in that State, which we call the *Morbid Sanguification*, in which there is undoubtedly the Concurrency of some Collateral Cause; besides the Natural Motions of the *Blood*, because it is found

Circulation the main Instrument of Sanguification.

found in some peculiar Distempers only, tho' there may be many degrees of Excess of Exaltation beyond the due State before it arrives at that inseparable pitch of Fluidity which manifests it self plainly to us; but being unheeded, and perhaps not Cognizable by any visible Token, we cannot account distinctly for 'em. It would indeed be of very great Service towards the Cure of Distempers, if such adæquate Tryals could be invented, as might discover the several Gradations towards or beyond *Salutary Sanguification*. But these being yet un-invented, must be left to future Industry and Sagacity.

Sanguification & Nutrition equally perplex.

By this Account of *Sanguification*, however rude and unaccurate, it will be obvious to any considering Person, that the same Difficulties, that occur in settling the distinct steps of *Sanguification* are to be met with in *Nutrition* also: For, whatever the *Nutritious Particles* may be, it is plain that from the first admission of the *Chyle* into the *Blood*, their Motion is confounded with the Motion of the *Blood*, and conformable to it, and consequently that no distinct Account can be given.

Nutritious matter various according to the Pores of the Parts.

Whatsoever Notions therefore Speculative Men may advance about the distinct and gradual Motions of the *Nutritious Matter*, and whatsoever Distributions they are pleased to make of this sort of matter

one part, and that to another, they exist in Imagination only, and admit of no Proof, nor indeed any regular Examination. For as the Nutritious Juice, or Juices, are mixt and circulate with the *Blood* thro' all the Parts of the Body; all, that we can distinctly conceive of 'em, is, that as the Excrementitious Parts are in their passage separated into specifically distinct Fluids, by means of *Glands* whose Pores are adapted to receive such Particles only as when they come together make such a *peculiar Species* of *Fluid*, as the *Urine*, which is separated by the *Kidnies*, the *Bile* by the *Liver*, and the *Saliva* by the *Glands* about the *Mouth*, &c. So we may conclude, without offering violence to Reason, or straining Inferences, that the Pores of the Parts to be Nourish'd, are so figur'd and form'd as to retain those peculiar Particles, which conform best to 'em. But we cannot with any Foundation pretend to tell what sort of Particles each Part retains, unless we knew distinctly likewise, how the Pores of those Parts were dispos'd, and cou'd tell precisely what parts they were capable of receiving, and what only: Which is a Degree of Knowledge I doubt no Man has ever yet arriv'd at.

The *Analysis* indeed of the Parts, do give us some gross *Idea* of the Materials whereof they were compounded, if we suppose, that the Bodies which we separate, pre-existed
in

in the *Blood* such as they then appear. But even thus we cannot carry our Speculations to any great Nicety. For all the Parts of an Animal (at least of those which we call perfect) yield the same Substances upon the *Analysis*, and the difference is only in the Proportion. This holds true even betwixt the *Fluids* and the *Solids*, some affording more *Oyl*, others more *Salt*, some more *Phlegm*, and others more *Caput Mortuum*, which (if we allow it to be an uniform Body, such as existed before) we may call in *Earth* to make up the Number of *Elements*. But, whether these were not form'd in the Body, by the Coalition there of Particles of Matter yet more simple, remains still a Doubt so weighty, as will render all Conclusions of this kind from the *Analysis* very precarious.

This being the best Guide we have, it might perhaps be better to rest contented with such a *Rationale of Nutrition*, as may fairly, (without straining or supposing) be deduc'd from the *Mechanical* Properties and Actions of the Bodies Nourishing, and to be Nourish'd.

Blood a
Compressi-
bleElastick
Fluid.

Let us therefore consider the *Blood* or *Circulating Fluid*, as a compressible *Elastick* Body, and the *Vessels* or *Solids*, which they permeate (at least most of 'em) as *Expansile* and *Contractile*, capable of being dilated and endued with a Faculty of *Resilition* or *Restitution*,

ation, which Properties will furnish us with a *Mechanical Idea* of *Nutrition* in general. For the *Blood* having, besides its *Progressive Motion* an *Expansive* one, which it derives from the included *Air*, which being rarified by the innate Heat of the Body, expands with it all the Parts of the Liquor with which it is mixt, and thereby pressing upon the sides of the Vessels extends and dilates their Pores, and so makes way for those Particles of the *Fluid*, whose Figure admits of it either to slip thro' those Pores, or to insinuate themselves into 'em, where by the reciprocal Contraction or Resilition of that Vessel, the Pores being again straitned, they are fixt, and so become a part of it, and supply the loss of those other Particles which by the continual Affriction, or Rubbing of the Fluid upon those Vessels, may have been abraded, and so by the Natural Consequence of their *Mechanism*, the same Fluid may be conceiv'd to repair the Decay it wou'd otherwise occasion. I know some will not grant the *Solids* to undergo any such loss of Parts, and consequently will not allow 'em to have any need of *Reparation* or *Nutrition*, after they have obtain'd their full Dimensions. But if they consider how fast a continual Flux of Water, which is not by infinite Degrees, so Rapid and Forcible, as that of the *Blood*, will wear even Stones; they will be hard put to it to shew how the Parts of
the

the Body, which are comparatively so very soft, shou'd endure so constant and so violent a Flux of Humours without decay.

Why greater in Young Bodies.

In *Young Bodies*, where the *Vessels* are much *Tenderer*, not only the sides are amplified by this Expansive Motion, and their Dimensions that way encreas'd by receiving more than they lose, but by the *Progressive* Motion, which naturally and strongly pushes forward, and wou'd not return but for the Bar and Check, which they receive at the Extremities of the Vessels, the containing Parts are gradually stretch'd out in length and by the Matter which insinuates it self every where into the Pores, are hindered from returning exactly to their first Dimensions, by which means they insensibly vegetate or Grow, which they continue to do till the supporting parts, the *Bones*, growing by degrees, rigid and firm, admit of no farther Extension, and thereby put a stop to the farther growth of the more flexible and yielding Parts, which are ty'd to, and limited by them.

Growth how circumscrib'd

Thus the *Dimensions* of the Body as to *Length*, are circumscrib'd to that precise *Stature*, which it had at the time when the *Bones* first acquir'd that unyielding Rigidity. And these Dimensions every Limb maintains during the rest of Life, unless by accident a Bone be broken, or by any Distemper softned again and render'd plyant, in which

which Case the other parts follow the Figure and Dimension of the Bone: As when it happens that the Fractur'd Parts of a broken Bone are not rightly put together again, as it often falls out in the Bone of the *Thigh*, where the under - part not being brought to Correspond rightly with the upper, the Weight of the Body making the upper bear downwards, they slip along each other, and the *Leg* is thereby shortned. The same thing happens without a change of Dimension of the Bones themselves, if the head of the *Thigh Bone* be turn'd out of its *Socket* in the *Ischium*, in which Case the weight of the Body makes the Trunk bear downwards, and the Flesh yielding for the head of the Bone to rise, the *Leg* appears shortned.

What it is that determines the yielding of the Bones to a stated time, pretty nearly agreeing almost always in all Persons, is hard to tell. All that appears certain in it is, that this Rigidity of the Parts comes on gradually, and that from our first Conception to that time, the encrease is by degrees less and less every Year, perhaps every Month, every Day, were we able to adjust our Observations so nicely as to calculate it. I am not Ignorant that many times the Growth receives a Check from some contingent Circumstances, of which we are not aware, and returns again when they cease

cease tho' insensibly to us. In Diseases we are indeed aware of this sometimes, and think we know what to impute it to, tho' even that we cannot do precisely.

Fluids
more tender in
Young Animals
than Old.

But it is not the *Solid Parts* only that are Tenderer in *Young Animals* than in grown ones; but the *Fluids* themselves are much more soft, and as it were Gummous, as we find by that Juice which we call the *Gravy* which the Younger the Meat is, the more *Gelatinous* it is.

Whence
this happens.

This seems to shew, that from whatsoever *Element* they are deriv'd, or however compounded, the *Nutritious Parts* are *Fibrous*, *Soft* and *Gelatinous*, and that consequently the less they are *Comminuted* and *Subtiliz'd*, the fitter they are for *Nourishment*. Hence it comes that the *Blood* of *Children* having undergone few *Circulations* in proportion to grown *Persons*, is in the same proportion more *Nutritious*, and the *Parts* which are form'd out of it more soft, flexible and yielding; which softness by length of *Time* and repeated *Circulations*, the *Fluids* as well as *Solids* gradually lose, till the latter resisting the impulses of the *Blood*, a stop is put to their *Growth*.

Bones
whence
form'd.

From hence also we may conclude, that *Bones* are form'd out of the most *Comminuted* or *Broken Parts* of the *Blood*, since we see that the *Blood* of *Old Men*, which by a long course of *Circulation* becomes in a

manner

manner even unfit for the common course of *Nutrition*, will however generate Bones, and convert into that sort of Substance, many of the *Tendons* and *Ligaments*, and even the Coats of the Vessels themselves, whose Substance being next to the *Bones* the most compact, admits only of the smallest Particles of the *Blood*, which therefore soonest become *Osseous*, as they are frequently found.

This *Theory* may furnish us with a reasonable Solution of that *Problem* which Dr. Sydenham's Problem *consider'd*.
 Dr Sydenham's Problem consider'd.
 Dr Sydenham propounds as unanswerable, and as an Argument against the Use of *Theory* in Physick, why a *Horse* or any other *Animal* arrives at his *Acme*, meaning his full Strength and Vigour, at a determinate Age; For tho' we cannot tell by what Proportions and Degrees this softness both of the *Humours* and *Solid Parts* wears off, yet we find that it gradually does so, and that all sorts of Animals have a stated Period of time in which the Circulations have reduc'd the *Solids* to such a State of Resistance, as to admit no longer of a Vegetative Encrease, and that gradually as this Vegetation declines, the Strength encreases, which depends upon the Resistance that the *Solids* make to the *Fluids*, in which consists the strength of *Muscles*. For the Action, or force of a *Muscle* consisting in the Resistance, which the *Muscular Fibres* make to the Effervescence of the *Blood*, or other
 H h Fluid

Fluid included in the *Belly* of the *Muscle* the Animal is then strongest, or in his greatest Vigour, when his *Muscles* are able to make the stoutest Resistance, which is when they will no longer admit of a Permanent Distention, that is, when they have done growing.

It may be objected, that the Resistance of the Vessels is yet greater in Aged Persons, and that according to this *Theory* it must be so; which notwithstanding is attended with Stiffness, want of Strength, Vigour and Heat, which is confess'd.

But, these things depending (as has been already shewn) upon the Mutual Action or Reaction of the *Fluids* and *Solids* upon each other, as the *Solid* Parts grow stubborn and unyielding to the Impression of the *Fluids*, so they lose their *Elasticity*, or *Faculty* of Resilition, or *Restitution*, by which the Motion of the *Blood* it self was invigorated and promoted; and by this Rigidity of the Vessels, the *Blood* is reduc'd to a meer *Circulatory* Motion, such as is impress'd by the Impulse of the Heart only without any room for the Expansive, upon which all the vital Actions depend, as much (at least) as upon the *Progressive*, though both be indispensably necessary.

But, besides this Indisposition of the Vessels (which from the *Theory* laid down unavoidably attends Age) the Humour then

themselves by long Attenuation, grow so much assimilated or homogeneous, that the Fermentation, or necessary Expansive Motion is but ill maintain'd, thro' which Defect, together with that of the Vessels, the Circulation it self Languishes, and all the vital Faculties gradually decay with it, till, if no Accident supervenes to hasten Death, which a little one in these Circumstances will do, nature it self fails, and they drop, like over-ripe Fruit, as it were, spontaneously and of course, into the Grave.

This *Theory* (as little able as we are to be precise and exact in it) will enable us to account for more Phænomena, and is capable of more Improvements, than any drawn from particular Humours, without any Force upon Nature, and running into Suppositions not warranted by the Mechanism of the Body. But, if it be (as I think) true, it suggests a way of preserving our selves longer than ordinary, if regular and early Care were taken, of which having no room to speak here, I shall reserve it to a farther Opportunity, and in the mean time leave it to the Consideration of others.

T A B. XIV.

F I G. I.

THE *Pulmonary Vein* with the Branches nearer each other, as in Expiration.

NB, The same Letters of Reference with the preceding Table, explain this likewise.

F I G. II.

A *Polypus* taken out of this Vein answering its largest Ramifications.

A N E W

Fig. II.



Fig. I.



Vena Pulmonalis

A
NEW SYSTEM
OF
ANATOMY.

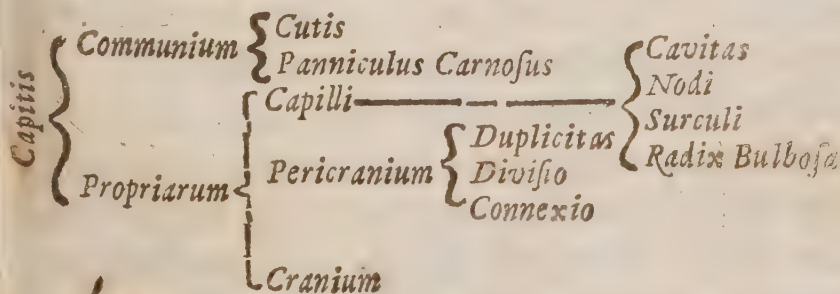
BOOK III.
Of the HEAD.

CHAP. I.

Of the containing Parts of the HEAD.

SYLLABUS

Generalis Partium Continentium



OF the containing Parts of the HEAD, some are Common, some Proper.

The common are the ſame with thoſe of the reſt of the Body, which are the Cuticle, Cutis, Membrana Adipoſa and Panniculus Carnoſus.

Skin.

The *Skin* it self is various in different Parts of the *Head*. On the *Scalp*, especially the hinder part of it, call'd *Occiput*, it is very thick and hard, on the *Face* it is thin, soft and smooth, but on the *Lips* thinnest of all.

Fat.

There is very little *Fat* about the *Head*.

Panniculus Carnosus.

The *Panniculus Carnosus* is plainly Muscular in the Fore-head of some, by means of which they move the *Skin* of the Forehead as they will. Others, in whom the *Occipital* and *Frontal Muscles* join their *Tendons* can move the whole *Scalp* of the *Head*.

Hair.

On the outside of the *Head*, out of that Part which is call'd the *Scalp*, springs the *Hair*, which tho' many have taken a great deal of unnecessary pains to exclude from the Number of the Parts of the Body, yet being the Product of it, and containing something very curious in their Structure, are worth a short Account. They are observ'd by the *Microscope* to be hollow, and furnish'd with a multitude of Vessels, and however to us they appear to be simple and equal the *Microscope* shews them to be knotted like some sorts of *Grass*, and to send out Branches at the Joints. Their *Cavity* has been otherwise prov'd by the Distemper call'd the *Plica Polonica*, in which the *Blood* it self has dropt thro' the *Hairs*. But I have never seen this Case, and am apt to doubt, whether the *Blood* that Issues be not

sent

sent from other Vessels, and only runs externally from the *Hair* to the extremity.

As for the *Branching* of the *Hair* 'tis pretty visible at the extremities, without a *Microscope* ; for it is very apt to split (as the *Hair-Cutters* call it) especially if it be worn long and kept dry. This division of the extremity, (which to the naked Eye seems to consist but of two or three *Hairs*) by the *Microscope* appears to be a Brush of *Hair*. Branching.

Each of these *Hairs* has a little *Bulbous* Root. or *Oval Root* in the Skin, which sometimes adheres to it, so as to be pluck'd away with it.

They are commonly reputed an Excrement, and esteem'd to be Nourish'd by such. But, whatever the matter of their *Nourishment* is, it seems to be more simple than the other Humours of the Body. For long after Death, when all the other Parts and Humours, are Putrify'd and Corrupted, the Hair will vegetate and encrease, which it appears to do so long as any moisture remains on the Part. Nourishment.

The *Proper* containing Parts of the *Head* are strictly in Number but two, the *Muscles*, and the *Membranes* ; Of the first of which we shall speak hereafter in its proper place. Proper containing Parts

Some make two containing outward *Membranes*, the *Pericranium* and *Periosteum*, which are in reality but one double *Membrane*. Membranes.

Connexi-
on.

brane, consisting of two *Coats*, as most others do, of which the Exterior is by some, by a distinct Name, call'd *Pericranium*, and the inner *Periosteum*, as lying immediately upon the *Bone*. This *Membrane* is pretty firmly connected to the *Dura Mater* by several *Fibres* transmitted from it to that *Membrane* thro' the *Sutures* of the *Skull*.

Division.

About the *Temporal Muscles*, these two *Membranes* part, the outer going over the *Temporal Muscles*, and the under remaining still close upon the *Cranium*. Which division, tho' common to the *Processes* of divers other *Membranes*, has occasion'd their being reckon'd distinct, and diversify'd by two Names.

Cranium

The *Cranium* may be reckon'd the *Basis* of the *Head*, and therefore not to be reckon'd among the *Parts* simply *Continent*. But of that, likewise, more in another place.

C H A P. II.

Of the M E N I N G E S or M E M B R A N E S
containing the B R A I N.

S Y L L A B U S.

Eorum quæ exhibent Cerebri Involucra seu. *Vid. App. Tab. xi.*

Meninges	Crassa seu Dura Mater	Connexio	
		Tunicæ	Exterior aspera
			Interior glabra
		Falx	
		Sinus	Longitudinalis
			Laterales
	Tenuis seu Pia Mater	Torcular Herophili	
		Motus	
		Tunicæ	Arachnoides, Exterior
			Interior
		Plicæ	
		Adhæsio ad Cerebrum	
		Connexio per Vasa	

I N Order to the Dissection of the Brain,
the Skull must be saw'd through the
middle of the Temporal Bones, and of the
Bone of the Forehead, and thro' the upper
part of Os Occipitis, which being carefully
done, so as not to wound the Membranes
lying under them, the Skull must be gra-
dually heav'd up with a Lever. The top
of the Skull being thus loosen'd from its Ba-
sis, by a sudden Jirk at the Os Frontis, it will
be successsfully freed from the Dura Mater,
that adheres very close to it by Fibres and
small Blood Vessels which perforate the
Skull, especially at the Sutures. *Way of opening the Skull.* The

Order of the appearance of the Parts of the Brain, &c. The *Skull* being open'd, first the *Meninges* containing, then the *Brain*, next the *Cerebellum*, and lastly the *Medulla Oblongata*, with all their *Vessels* present themselves to the view.

Meninx Crassa

Immediately under the *Skull*, lies a thick tough *Membrane*, call'd *Meninx Crassa*, or *Dura Mater*, which covers the whole Substance of the *Brain*, and *Spinal Marrow*, and affords likewise a Coat to the *Trunk* of the larger *Nerves*.

Connexion

It is Connected on the upper-part to the *Periosteum*, by means of *Fibres* (already describ'd) which pass thro' the *Sutures* from one to the other. On the under-side it is ty'd to the *Pia Mater*, by the Branches of the *Sinuses*, and by the *Arteries* and *Nerves*.

Coats.

This *Membrane* consists of two Coats. The *Exteriour* hard, dry, and somewhat rough: The *Inner* more smooth, soft and moist. It descends double between the two *Hemispheres* of the *Brain*, which it divides, as deep as the *Corpus Callosum*, and by reason of its Curvature occasion'd by the Connexity of the *Brain*, it is in that part call'd *Falx*, from the Similitude which it bears to a *Sickle*. It likewise insinuates it self between the *Brain* and *Cerebellum*, and by that means hinders the *Brain* from lying too heavy upon the *Cerebellum*.

Falx.

In these Duplicatures are several Cavities ^{Sinus.} call'd *Sinuses*, which are a sort of Venous Channels form'd for the re-conveyance of the *Blood*, and plac'd between the Duplicatures of this *Membrane*. Of these, *Four* only are considerable.

The *First* of these call'd ordinarily *Sinus Longitudinalis*, runs along the middle of ^{Longitudinalis.} the *Convex Part* of the *Brain* from the ^{Fig. i.} *Crista Galli*, to the hinder part of it, where it is divaricated, sending out on each side between the *Brain* and *Cerebellum* a Branch, which are call'd the *Lateral Sinuses*; and ^{Laterales} besides a third Branch which descending thro' part of the Substance of the *Brain* to the *Glandula Pinealis*, terminates in the *Torcular Herophili*, which is form'd out of the ^{Torcular Herophili.} Concourse of this and the *Lateral Sinuses*. ^{li.} This *Sinus* is much less than the rest. Besides these *Sinuses*, there are divers others on the *Basis* of the *Skull*, on the *Offa Petrosa*, and round the *Sella Turaca*, which are constant and uniform in most Bodies: Tho' Nature sports as well in these as in the Veins of other parts of the Body, which therefore scarce deserve our pains to be very particular in.

All these *Sinuses* are form'd out of the ^{Sinuses} several *Venous* Branches, which return the ^{whence} *Blood* from the *Brain* and *Cerebellum*, and ^{form'd.} deliver their Contents into the *Jugular* Veins,

Veins, of which they are, as it were, the *Roots* from whence they spring.

Motion.

The *Coats* of these *Sinuses*, (especially about the *Divarication*) are furnish'd with many *strong Fibres* seemingly *Nervous*, by means of which, as they are dilated by the *Influx* of the *Irruent Blood*, so they are contracted again, and by their *Alternative Dilatation* and *Contraction*, create a *Reciprocal Motion*, like the *Pulse* of an *Artery*.

Arach-
noides,
the Exte-
riour La-
mina of the
Pia Mater

Immediately under this *Membrane*, lies another very *Fine*, *Transparent* one, from its extream *Thinness* and *Fineness* compared to a *Spider's Web*, and call'd *Arachnoides*, which between the *Dura* and *Pia Mater*, covers the whole *Substance* of the *Brain*. But this ought to be look'd on no otherwise than the *External Lamina* of the *Pia Mater*, which sends its *Internal Lamella* between the *Folds* of the *Cortical* part of the *Brain*.

Pia Mater
Fig. iii.

Under this, immediately upon the *Brain*, lies the *Meninx Tenuis*, or *Pia Mater*, which is also a *Thin*, *Fine Membrane*, adhering so closely, and insinuating it self into all the *Folds* of the *Cortical* part of the *Brain*, that it is scarce to be separated from it. This *Membrane* covers the whole *Brain*, *Cerebellum*, and *Medulla Oblongata*, and serves (together with the before-mentioned) for the *Defence* of the *Brain*, and support of its *Vessels*.

C H A P. III.

Of the BRAIN.

S Y L L A B U S

Partium Principum, quæ Constituunt, & Eorum quæ notanda sunt Circa.

Cerebrum	Situs	
	Divisio in Hemisphæria	
	Substantia	{ Corticalis, Glandulosa
		{ Medullaris, Nervosa
	Corpus Callosum	
	Fornix	
	Septum Lucidum	
	Ventriculi quatuor	{ Laterales duo
	Anfractus	{ Rima
		{ Quartus Innominatus

THE BRAIN (in the Vulgar Accep-
tation) comprehends the whole Con-
tents of the Skull, but in the Sense of Ana-
tomists, is restrain'd to that large Globous
Part, which fills only the fore and upper
part of it, the hinder part being possess'd
by the Cerebellum, and the under by the
Medulla Oblongata.

Brain.

Division.

The Brain (strictly so call'd) is divided
by the Duplicature of its Membranes into
two equal parts, commonly call'd Hemi-
spheres,

Hemi-
spheres
of the
Brain.

spheres, tho' the *Brain* it self in this restrain'd Acceptation, be far enough from an exact *Spherical Figure*.

The *Brain* consists of two sorts of Substances, one of a Cineritious or Ash Colour which being the *Exteriour*, is call'd the *Cortical Part*, which *Malpighius* by his *Microscopes* has discover'd to consist of innumerable *Minute Glands*, of various Sizes and Figures, intermixt with abundance of excessive fine *Blood Vessels*. This Part, by means of the Fissures and Sinuosities of the *Brain*, seems to enter deep into the Substance, tho' in reality it does not so, and reaches but the depth of half an Inch or thereabouts, unless where the *Anfractu* or Discontinuations seem to let it in.

And Medullary

The inner part, which is more soft, and very white, is call'd the *Medulla*, and is suppos'd to consist of infinitely fine, soft *Tubes* which receive from the *Cortical*, or *Glandulous Part*, the *Fluid*, which it separates and by means of the *Nerves*, (which are only Productions of this Part) distribute it all over the Body.

Corpus Callosum

As soon as the *Membranes* are remov'd (which is no easie Task upon the Account of the strict Adhæson of the *Pia Mater* which is scarce separable till the *Brain* begins to Putrifie, unless it happens to be a sort of an *Hydropical Brain*, abounding with *Serous Humours*. Between the *Hemispheres* of the

Brain

Brain, under the *Sinus Longitudinalis*, appears a white Substance of a Texture, somewhat more compact than the rest of the *Medullary* part of the *Brain*, call'd therefore *Corpus Callosum*, which runs along the whole Tract of the *Falx*, and receives from each side the Terminations of the *Medulla*, which is interspers'd between the several Windings or Convolutions of the *Cortical* Part, and is suppos'd to be a sort of *Basis* or support to it.

At the Extremity, next the *Cerebellum*, it sends out two *Processes*, or *Legs*, by the Juncture of which is Constituted that Body which is call'd the *Fornix* or *Arch*. Fornix.

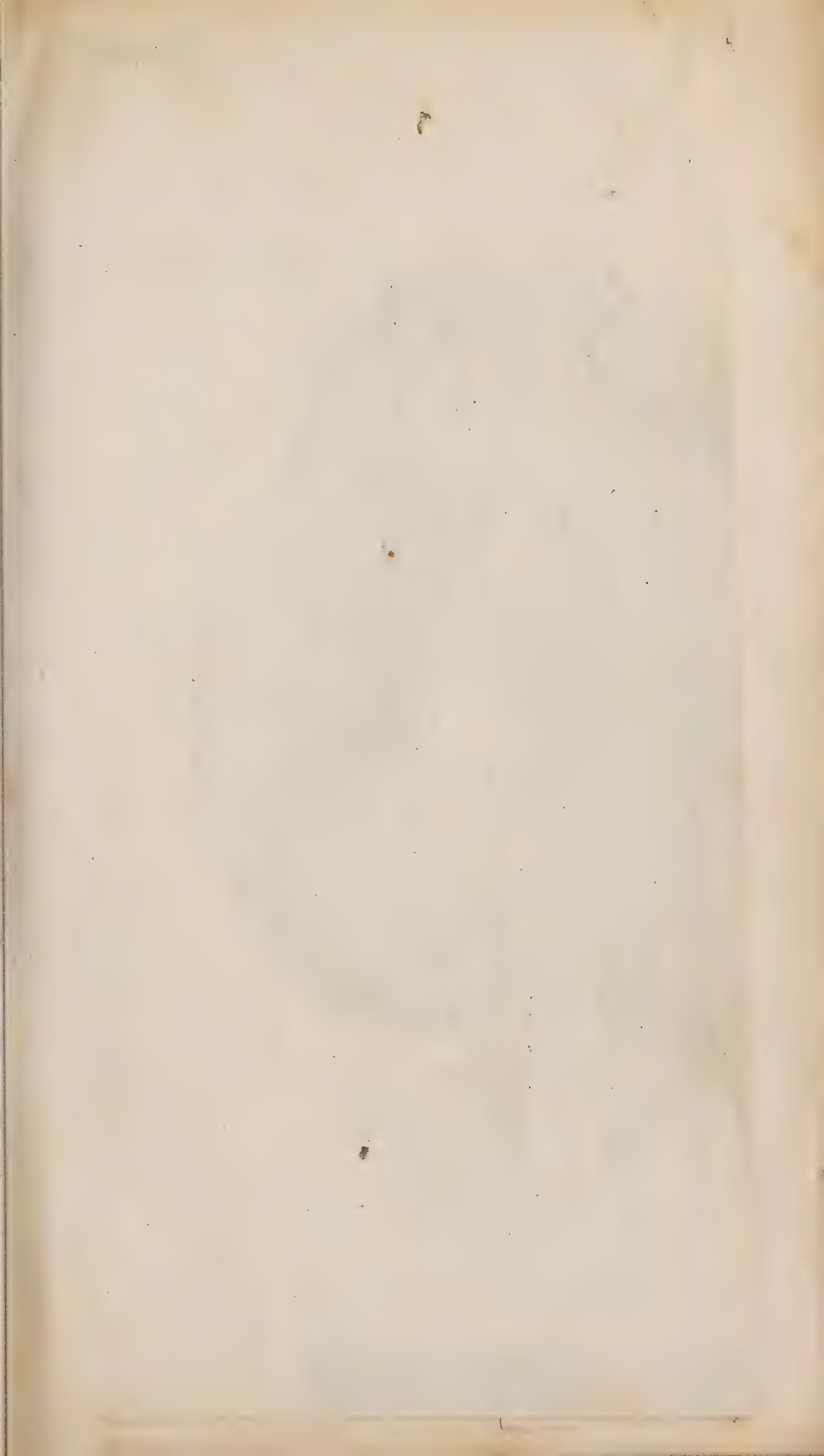
Underneath this *Fornix* is found a Thin Transparent Substance, differing from the *Fornix* or *Corpus Callosum* it self, only in its *Tenuity* and *Diaphaneity*. From the *Fornix* it is continu'd all along under the *Corpus Callosum*, dividing the two great *Cavities*, or *Lateral Ventricles* of the *Brain* from each other. This Body is call'd the *Septum Lucidum*. Septum
Lucidum

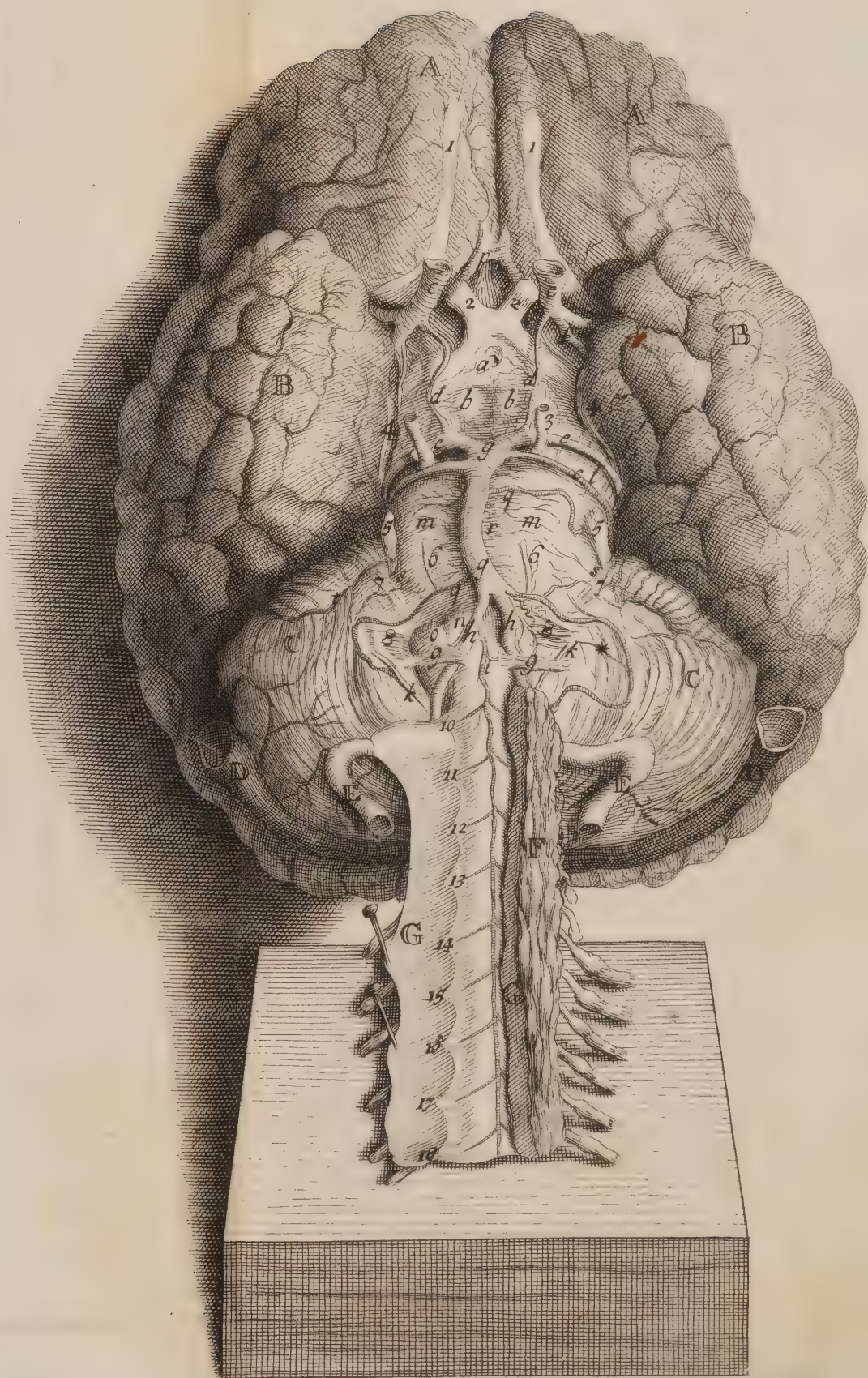
In each *Hemisphere* of the *Brain* is a pretty large *Cavity*, which are call'd the *Lateral Ventricles*. Besides which, just under the *Fornix*, as it were, between the *Bifurcation* of it, is another *Cavity*, call'd the *Rima*, which tho' abundantly less than either of the other, is reckon'd as a *Third Ventricle*. And between the *Cerebellum* and the Ventricles Four,
Lateral Two.
Rima.

Fourth Ventricle the *Medulla Oblongata*, is a *Fourth*, which are call'd the *Four Ventricles* of the *Brain*.

Corpora Striata. In the *Lateral Ventricles* on each side, appear the *Corpora Striata*, and the *Alæ* of the *Plexus Choroidalis*, which belonging to the *Medulla Oblongata*, and the *Blood Vessels* shall be described in their proper places.

T A B.





T A B. XV.

SH E W S the *Basis* of the Brain, and part of the *Medulla Oblongata*, with the Blood Vessels injected with *Wax*.

AA, The *fore Lobes* of the Brain.

BB, The *hinder Lobes*.

CC, The *Cerebellum*.

DD, The *Lateral Sinus's*.

EE, The *Vertebral Arteries*, as they run between the first *Vertebra* and Bone of the *Occiput*.

F, The *Vertebral Sinus*.

GG, The *Dura Mater*, on the right side, taken off from the *Spinal Marrow*, but remaining on the left.

1, 2, 3, 4, &c. Ten Pair of *Nerves* belonging to the Brain, and the first Seven of the *Spinal Marrow*.

a, The *Foramen* opening from the *Infundibulum* into the *Pituitary Gland*.

bb, The two *White Protuberancies* behind the *Infundibulum*.

cc, Two Trunks of the *Carotid Arteries*, cut off where they began to run betwixt the fore and hinder Lobes of the Brain.

dd, Two Arteries joyning the *Carotids*, with the *Cervical Artery*, call'd the *Communicant Branches*.

ee, Two other large Branches of the *Cervical Artery*, which help to make up the *Plexus Choroides*.

f, Branches of the *Carotid Artery*.

g, The *Cervical Artery*, compos'd of the Two Trunks, hh, of the *Vertebral Arteries*,

I i

which

which here runs along the Annular Protuberance somewhat contorted, as in other Subjects streight, and others yet more contorted.

hh, Two Trunks of the *Cervical Arteries* lying on the *Medulla Oblongata*.

i, The *Spinal Artery*.

kk, The *Spinal accessory Nerve*.

ll, The *Crura* of the *Medulla Oblongata*.

mm, The *Annular Protuberance* or *Pons Varolii*.

n, That part of the *Caudex Medullaris* on the right side, call'd by *Willis* and *Vieussen*. *Corpora Pyramidalia*.

o, That part on the same side call'd *Corpus Olivare*.

p, The fore-Branch of the *Carotid Artery*, which divides the *Anterior Lobes* of the *Brain*.

qq, Other little Branches of Arteries, which help to constitute the *Plexus Choroides*.

rrr, Branches of Arteries from the *Cervical Artery*, dispers'd through the *Annular Protuberance*.

ss, Part of the second Process or *Peduncle* of the *Cerebellum*.

*, A small Branch of an Artery, passing between the *Fibrille* of the *Ninth Pair* of *Nerves*.

C H A P. IV.

*Of the MEDULLA OBLONGATA,
its Nerves, Blood-Vessels, and other Ap-
pendices.*

S Y L L A B U S

Partium & Vasorum, &c.

Medulla Oblongata { *Situs*
 Substantia
 Crura---a Cerebro
 Pedunculi---a Cerebello
 Protuberantia Annularis
 Corpora Striata
 Tnalami Nervorum Opticorum.

THE MEDULLA OBLONGATA is the Medullary part of the Cerebrum and Cerebellum. The fore-part of it from the Brain, the hinder from the Cerebellum. It lies upon the Basis of the Skull, and is continu'd thro' the great Perforation of it into the hollow of the Vertebra of the Neck, Back and Loins. But, after its Exit from the Skull, it is call'd by another Name, viz. *Medulla Spinalis*.

It arises, as it were, from four Roots, Crura. of which the two largest spring from the Brain, and are call'd CRURA: The two lesser from the Cerebellum, which have been nam'd PEDUNCULI by Dr. Willis.

Substance The Substance of the *Medulla Oblongata*, seems to be purely *Nervous*, and to be only an Aggregate of those small fine Tubes, thro' which the *Spirits* are suppos'd to pass.

Protuberantia
Annularis.

To examine this part of the *Brain* regularly, it ought to be inverted, and then first appears upon the Trunk of it a *Protuberance* in form almost like a *Ring*, which has therefore been call'd, by Dr. *Willis*, *Protuberantia Annularis*.

Nerves,
Ten Pair.

But in the taking the *Brain* out of the *Skull*, the Ten Pair of *Nerves*, which come immediately from the *Brain*, are best shewn.

Olfactory.

For by first raising the fore-part of the *Brain*, just below the *Os Frontis* the OLFACTORY NERVES come in view, which being pretty thick near the *Os Cribrosum* are there call'd *Processus Papillares*, which is (in my Opinion) a properer Name than that of *Olfactory Nerves*, in that place, because they seem rather to be Productions of the *Medulla Oblongata* from which the *Olfactory Nerves* arise, than distinct *Nerves*, against which their manifest *Cavities*, and their Communication with the *Ventricles*, argue.

Branches
of the Carotid
Arteries.

Immediately behind these *Nerves* appear two small *Arteries*, which are Branches of the *Carotides*.

Optick
Nerves,

The next Pair are the OPTICKS, which, arising from the *Crura* of the *Medulla Oblongata* on each side, come together, above the
the

the *Infundibulum*, and after parting again, go each of them to the *Eye*, on the respective side from whence they spring. This Concurrence has laid the Foundation of an Error, (in some *Anatomists*) that they decussate one another, and that each of them serves the *Eye* of the side opposite to that from which they have their Original. Do not decussate each other.

The *Optick Nerves* being cut off, the *INFUNDIBULUM* appears just under them, which ends in the *Glandula Pituitaria*, and on each side of it the *Carotid Arteries* enter the *Skull*, thro' the *Os Cuneiforme*. Infundibulum.

Next to these are the *OCULORUM MOTORII*, which shooting out of the *Basis* of the *Medulla Oblongata* behind the *Infundibulum*, proceed forward to the *Eyes*. Oculorum Motorii.

The Fourth Pair which are very small, are by *Willis* call'd *PATHETICI*, by others *Amatorii*. These have their Roots in the upper-part of the *Medulla Oblongata*, near the *Cerebellum*, and pass thro' the same Perforations with the former Pair to the *Eyes*. Pathetici.

The Fifth Pair, which is the largest of any that come directly from the *Brain*, consists of a Coalescence of divers small *Nerves*, which spring from each side, from the fore-part of the *Processus Annularis*, and is again before its *Exit* from the *Skull*, divided into two or three Branches, which go out of the *Skull* at several Perforations. The Fifth Pair.

The Sixth
Pair,

The *Sixth Pair* arises likewise from, or near the *Processus Annularis*, on the hinder-part where the *Processus* seems not to be absolutely continu'd, and therefore it may be accounted to arise from the *Medulla*. It passes out of the *Skull*, thro' the same Holes with the *Oculorum Motorii*. Both these Pair, because they send some Branches to the *Tongue*, are call'd *Gustatorii*.

Gustato-
rii.

The Se-
venth

Pair, or
Auditorii

The *Seventh Pair* are the AUDITORY which arise from the *Medulla Oblongata* near the place where the *Processus Annularis* shou'd be, if it were intire. It passes out of the *Skull* thro' the Perforations of the *Osteum Petrosum* in two *Processes*, one of which is soft, and spongy, which goes to the *Labyrinth* and *Tympanum* of the *Ear*. The other, which is more compact and hard to the *Tongue* and other parts of the *Face*.

The
Eighth
Pair, or
Par Va-
gum.

The *Eighth Pair*, or PAR VAGUM, arise laterally from the *Medulla Oblongata*, a little below the former, and pass out of the *Head* between the *Os Occipitis* and *Osteum Petrosum* thro' the same Perforations, that the *Sinus Laterales* of the *Dura Mater*, or Branches of the *Jugulars* do. It is joyn'd by a Branch of the *Accessory Nerve* from the *Medulla Spinalis*, and by a Twig of the hard part of the *Auditory*.

The Ninth
Pair.

The *Ninth Pair* arise from the middle part of the *Centrum Ovale*, between the *Corpora Pyramidalia*, and *Olivaria* of the *Medulla*.

Medulla Oblongata by three or four small Twigs, and go out of the *Skull* near the *Processus* of the *Os Occipitis*, and send their Branches to the *Tongue*, as well to the *Papillary* as *Muscular* part of it, and likewise to all the *Muscles* that serve for the Motion of the *Tongue*: From whence these *Nerves* have been call'd *Linguae Motorii*, tho' they cannot justly be excluded from the Name of *Gustatorii* likewise, as they concur in that Office, with the Branches of the *Fifth* and *Sixth Pair*.

The *Tenth*, which is the last *Pair*, (even with those that will allow it to belong to the *Brain*) arises by two or three Branches from the *Medulla Oblongata* just below the *Corpora Pyramidalia* and *Olivaria*, or rather at the beginning of the *Medulla Spinalis*, from whence reflecting a little backwards it goes out of the *Skull*, between the first *Vertebra* of the Neck, and the *Processus* of the *Os Occipitis* of the same Orifice, thro' which the *Vertebral Arteries* enter, and is spent upon the the *External Muscles* of the *Head* and *Ears*.

Authors have differ'd about the Number of *Nerves* that have their *Rise* within the *Skull*, and this latter *Pair* is yet by many excluded from that Number. But this is a Controversie of no great Importance. Their difference about the distribution of them is more Material. Of that we shall

have occasion to speak more largely hereafter.

Lateral
Ventricles of the
Brain,
how to be
examin'd.

The *Brain* being cleared from the *Skull* and the Original and Passage of the *Nerve* regularly trac'd, it will be proper to lay the *Brain* upon the *Basis*, and return to the *Lateral Ventricles*. In which we shall find two *Prominences* on each side, one Pair call'd *Corpora Striata* being the Extremities of the *Crura* of the *Medulla Oblongata*, the other *Thalami Nervorum Opticorum*.

Corpora
Striata.

Situation

The *CORPORA STRIATA*, are a *Medullary* part call'd *Striata*, only from the visible appearance of *Nervous Fibres* immediately upon the abrasion of the *Membrane* and Surface of them. They lye in the fore-part of the *Ventricle*, and are of a *Lenticular* Figure, somewhat bigger, and approaching to each other at the fore-end than the hinder, which point laterally and are not only narrower, but farther distanc'd from one another. They are joyn'd together by the *Transverse Medullary Process*. The *External Substance* of them is *Cortical* or *Glandulous* as the superficial part of the rest of the *Brain* is, tho' it be not here so deep. The *Inward* is that strip'd *Medullary* part from whence they take their Name, which upon scraping is very plain.

Substance
of the
Fornix.

Betwixt these two is that *Medullary Body*, which is call'd the *FORNIX*, which is a broad, thin production of the *Medulla*.

A little below these *Corpora Striata*, lie two other *Prominences* call'd *THALAMI NERVORUM OPTICORUM*, because the *Optick Nerves*, have their *Rise* from them. These, contrary to the former, have their *External Part*, or *Surface*, next the *Ventricle Medullary*; and their inner *Cineritious* or *Cortical*.

On either side of these *Protuberances* is to be seen a small *Plexus* of *Blood Vessels* call'd *PLEXUS CHOROIDES*, consisting of a great many minute *Ramifications* of the *Veins* and *Arteries*, with small *Glands* interspers'd, among which some pretend to find *Lymphatics*, the *Existence* of which is much easier from *Reason* to be imagin'd, than to be demonstrated to sight.

Underneath the *Fornix* is a small *Cavity* opening with a very narrow *Aperture*, call'd the *RIMA*, into the *Infundibulum*. This, as we have already observ'd, is call'd the *Third Ventricle* of the *Brain*.

At the bottom of this *Cavity*, just below the *Coalition* of the *Optick Nerves*, lies the *INFUNDIBULUM*, which seems to be nothing else but a passage continued from this *Third Ventricle* to the *Glandula Pituitaria*, between the *Medullary Parts* of the *Brain*, and lin'd with the *Pia Mater*, and therefore not so properly to be look'd upon as a *Vessel*, but as an out-let for *Serosities*, tho' this *Glandula Pituitaria*, to which it is

con-

continu'd, seems no proper Drain for 'em however it may have been esteem'd hitherto.

Underneath the *Infundibulum*, in the *Sinus* of the *Skull*, which is call'd *Sella Equina*, or *Turcica*, upon the *Os Cribrosum*, is situate the GLANDULA PITUITARIA so call'd from its suppos'd Office of receiving and discharging the *Serous Humours* evacuated by the *Ventricles* of the *Brain*. But tho' the Use of this Part, as of divers others, about the *Brain*, does not plainly and distinctly appear to me, yet I cannot admit of this Use, both because it is against the Office of a *Gland*, to receive Humours already secreted, which a Vessel of a more simple Structure might more readily and easily perform, and because it is the peculiar Office of *Glands* to separate Humours before unsecreted, which two Uses imply a direct Repugnance not to be reconcil'd. But besides the Structure of this *Gland*, which is firmer than any other of the Body, makes it absurd to think, that it shou'd, like a *Sponge*, suck up Humours, not only in Contravention to its own Use as a *Gland*, but likewise in violence to its own Structure, which is more compact than that of other *Glands*, especially of those of the *Brain*. I do therefore imagine that it does, as other *Glands*, serve to secrete some Humour or other, tho' to what purpose,

Glandula
pituitaria

Its Use not
certain.

Not to re-
ceive Hu-
mours al-
ready sepa-
rated.

is not so apparent. This *Gland* is very small This Gland larger in Brutes than in Men.
 in *Humane* Bodies, but in *Brutes* much
 larger, which difference may at some time
 or other, suggest to a Man of happy Saga-
 city something concerning the true Use of
 it. It is cover'd with two Coats from Has Two Coats.
 the *Meninges* of the *Brain*.

Surrounding this *Gland* in the *Sella Tur-*
cica, is a small *Plexus* of Vessels call'd *RETE*
MIRABILE, which is either not existent Rete Mirabile.
 in Men, or so very minute that its Exist-
 ence is fairly doubted. In *Brutes* it is
 Conspicuous enough, and by *Willis* is said
 to consist of *Arteries*, *Veins* and *Nerves*;
 by *Vieussens* of *Arteries* only, and by others,
 of *Arteries* and small *Veins*. This is a Con-
 troversie not easie to be decided, and scarce
 worth the trouble. All that appears cer-
 tain is, that it consists mainly, if not whol-
 ly, of some Ramifications of the *Carotid* and
Vertebral Arteries.

On the hinder Part of the *Third Ventricle*, Anus.
 or Cavity, is a small *Foramen*, or Hole,
 leading to the *Fourth Ventricle* in the *Cere-*
bellum. This Cavity is call'd the *ANUS*.

At the Mouth, or Orifice, of this passage, Glandula Pinealis.
 is seated a small *Gland*, which, from its
 fancy'd Resemblance in form to a *Pine-*
Apple, has been call'd *CONARIUM* or
GLANDULA PINEALIS, which *Des-*
cartes, and some of his Followers, have ex-
 travagantly enough imagin'd to be the Seat
 of the Soul. On

Nates &
Testes.

On the back-side of the *Medulla Oblongata*, about the Stem of it, near the *Cerebellum*, appear four *Protuberancies* or *Eminencies*, of which the upper Pair, which are the larger, are call'd *NATES*: The under and lesser, *TESTES*. The Substance of both these is *Medullary*. The latter are over and above cover'd with a *Plexus* of Blood-Vessels.

Calamus
Scriptorius.

Betwixt these and the Processes of the *Cerebellum*, to which they are join'd on the sides, is a Cavity making a hollow in the middle, which is the *Fourth Ventricle*, and has from its Figure been call'd *CALAMUS SCRIPTORIUS*.

Corpora
Pyrami-
dalia and
Olivaria.

Besides those before mentioned on the *Medulla Oblongata*, near the Extremity of it are Four other *Prominencies*, two on each side called *CORPORA PYRAMIDALIA* and *OLIVARIA*. The first situate in the middle of the *Basis* of the *Medulla*, just below the *Processus Annularis*, contiguous to each other. The latter on each side of the former. These Names were given them from their suppos'd Resemblance.

C H A P.

C H A P. V.

Of the CEREBELLUM.

SYLLABUS.

Partium Principium.

Cerebelli	{	Substantia	{	Corticalis Cineritia	{	Eadem cum Cerebro
			{	Medullaris Alba		
		Superficies Inaequalis, Gyrosa				
		Processus Vermiformis				
		Pedunculi				
		Pons Varolii				
		Arteria	{	Carotides		
			{	Vertebrales		
		Vasa Sanguifera	{	Rete Mirabile		
		Venæ	{	Rami Jugularium		

THE CEREBELLUM, (so call'd ^{Cerebellum.} from its distinction from the *Brain*, both in Size and Situation) has been look'd upon as a little *Brain* by it self, and is placed in the hinder and lower part of the *Skull*, underneath the hinder part of the *Brain*.

It consists, as the *Brain* does, of a **COR-** ^{Sub-}
TICAL and **MEDULLARY** Part, the ^{stance.} several Branches of which latter resemble, when open'd, those of a Tree, and meeting in the middle form a kind of a Stem which runs quite through it.

Its

Superfi-
cies.

Its Surface is unequal, but not so Gyrous or Winding, as that of the *Brain*, but looks rather as if it were laminated like some sort of Shells, the middle Circles being the largest, and the deepest growing more plain by degrees, till it terminates at length on each side of the *Processus Vermiformis*. so call'd from its resemblance of a Worm.

Processus
Vermi-
formis.

As in the Convolution of the Brain, Duplication of the *Pia Mater* is insinuated betwixt each of them, so 'tis here likewise between the *Lamina*, tho' not, by much so deep, as in the Brain.

Peduncu-
li.

The *Cerebellum* is join'd to the *Medulla Oblongata*, by two *Medullary Processes*, nam'd by *Willis*, *Pedunculi*, in which he observ'd three distinct *Processes* on each side. The two first of which go on each side to the *Testes* before describ'd, and betwixt them runs a *Medullary Substance* covering the upper-part of the *Anus*, call'd *Valvula Major*. The second goes directly from the *Cerebellum* to the *Medulla Oblongata*, decussating the former, and forms the *Processus Annularis*. The third springing from the hinder-part of the *Cerebellum* is inserted into the *Medulla Oblongata*, looking like an additional *Chord* to it.

Pons
Varolii.

Besides these, there are observ'd two or three other *Medullary Processes*, which passing a-cross the *Medulla Oblongata*, make that *Arch*, which from the Discoverer is call'd *Pons Varolii*. A

All the aforementioned Parts of the Brain and *Cerebellum*, are furnish'd with Blood by Two Pair of *Arteries*, which are the *Carotids* and the *Vertebrals*.

Vessels
of the
Cerebrum
and *Cerebellum*.

The first of these enter the Skull thro' the Perforations of the *Os Sphænoides*, on each side of the *Sella Equina*, and immediately sends out some Branches to the *Glandula Pituitaria*, lying within that Cavity, which branches in most sort of Brutes, are more large, and numerous than in Men, and being complicated with correspondent Veins, make that conspicuous *Plexus* of Vessels, which in them is call'd the *Rete Mirabile*; but in Men is so inconsiderable, as generally, tho' not truly, to be thought wanting. After this, these *Arteries* piercing the *Dura Mater*, are divided into three *Principal* Branches, which are call'd the *Anterior*, *Lateral* and *Posterior*. The *Anterior* of each side coming to a Conjunction near the Coalition of the *Optick Nerves*, send off two pretty fair Branches to the *Os Cribrosum*. The *Lateral* running a-cross the two *Hemispheres* of the *Brain*, make a kind of Section of it into the fore and hinder-part. The *Posterior* meeting behind the *Infundibulum*, sending off the two larger Twigs, on each side proceed in a single Trunk to the *Protuberantia Annularis*, where that Trunk joins with the *Vertebral Arteries*.

Carotids.

Rete Mirabile.

Tripartite Division of the Carotids.

These

Vertebral
Arteries.

These enter the Skull through the great *Foramen* of the *Os Occipitis*, creeping up along the sides of the *Medulla Oblongata*, under the *Basis* of which they proceed severally to the afore-mentioned *Conjunction* where they meet and join with the single Trunk of the *Carotids*.

Veins.

The lesser Ramifications of these *Arteries* are dispers'd through all the Substance of the Brain, *Medulla Oblongata* and *Cerebellum*, where they meet with abundance of small *Veins*, which do not come together in any Trunk, till they arrive at the several *Sinuses* of the *Dura Mater*, from whence the Blood is return'd to the Heart by the *Jugulars*.

Bidloo's
Error
concern-
ing the
Veins.

The want of a considerable *Venous* Trunk in any part of the *Brain*, *Medulla* and *Cerebellum*, has occasion'd some Anatomists, particularly * Mr. Professor Bidloo, to assert that there were no Veins in the *Brain*; an Error which he has stiffly maintain'd in his *Epistle* or *Citation* of Mr. Comper before the *Royal Society*; altho the Veins, which empty themselves into the *Sinuses*, be not only numerous, but conspicuous enough, and pretty fairly delineated in the *Anatomical Figures*, Publish'd by him, but not taken notice of in his *Explication*.

* Bidloo's
Gulielmus.
Comper
Citatus,
&c.

Distribu-
tion of
the Arte-
ries in
the Brain

The numerous minute Ramifications of these *Arteries*, are scarce to be discover'd in a general *Dissection* of the *Brain*. But
if

if the *Carotids* and *Vertebrals* be injected with Wax, they shew a very elegant distribution thro' the whole Substance of all these Parts, as is express'd in T A B. XV. EE, cc, dd, ee, f, g, h, i, *, p, q, r, &c. as also in the Scheme of all the large Trunks of the *Arteries* of the whole Body, hereafter to be met with.

K k

C H A P.

C H A P. VI.

Of the MEDULLA SPINALIS.

S Y L L A B U S

Partium, quæ pertinent ad

Medullam Spinalē.	Substantia Duplex	{	Exterior Medullaris	
			Interior Cineritia	
			Inferior Fasciculosa, seu Nervosa.	
	Nervorum Spinalium Paria Triginta			
	Tunica	{	Exterior Communis, seu Prima Nervosa	
			Interior Prima Propria a Dura Matre	
			Arachnoides, seu Secunda Propria	
			Quarta, seu Tertia Propria a Pia Matre	
	Vasa	{	Arteriæ {	A Vertebralibus, Spinales
				Ab Aorta, Intercostales
{		Vena seu Sinus Venosi {	In Cervice ad Cervicales	
			In Thorace ad Venam sine Pa	
			Inferius ad Truncum Cavæ.	

Medulla
Spinalis.

THE Medulla Spinalis, or Spinal Marrow, is little more than a Production of the Medulla Oblongata, or Medullary Part of the Brain. It consists as the Brain does of two parts, a *White* or Medullary, and *Cineritious* or Glandulous; but with the Position inverted. For whereas in the Brain the Cineritious Part is the Exterior everywhere (except in part of the *Basis* in the Spinal Marrow) it is surrounded with the *White* Part, by which contrivance any unnecessary Reflexion of the Nerves is avoided, and they go immediately out from the

Medulla

Medullary Part, which they cou'd not have done, had the *Cineritious* been external as in the *Brain*.

As soon as it falls out of the Skull thro' the great Hole of the *Occipital* Bone, it takes the Name of *Spinalis* instead of *Oblongata*.

The *Substance* of the exterior part is much the same with that of the *Corpus Callosum*, only somewhat more tough, and more distinctly fibrous, which difference the lower it descends is gradually more apparent. The reason of which difference is the straitness of the Cavity, which growing gradually more narrow presses the *Medullary Fibres* closer together, and renders them more compact, and gathers them into more distinct *Fasciculi*, till having descended through the whole Tract of the *Spine*, they end at last in the *Cauda Equina*.

Out of the *Medulla Spinalis* springs Thirty Pair of *Nerves*, which are nothing but *Fascicles* of *Medullary Fibres* cover'd with their proper Membranes.

Spinal Nerves.
Tab. xv.

The *Coats* of it some reckon to be Four. The first or *Exterior* of which is a strong *Nervous* Membrane, and serves as a Ligament to tie the *Vertebrae* together to the inside of which it firmly adheres, and therefore is not so properly reckon'd among the *Coats* of the *Medulla*. This generally appears moist with a viscous Humour, and

Coats,

in Fat People is furnish'd with an Oily Fat about the Junctures of the *Vertebrae*.

Second
or First
proper.

The Second, or rather first proper Coat is a Production of the *Dura Mater*, which embracing the *Medulla* loosely on the hinder-part, takes firmer hold on it on each side at the egress of the Nerves. This Membrane, immediately upon its Exit from the Skull, where it adheres to the Margin of the great *Foramen*, grows so thick and strong, and is furnish'd with so many fleshy Fibres, that it seems externally according to *Vieussen*, to resemble a thick Ligament, and even on the inside to appear both for Colour and Substance like a strong fleshy Membrane. Towards the fore-part it is loosely connected to the *common Integument* or *inward Vertebral Membrane* before describ'd. In its Progress downwards, especially after it has pass'd the *Vertebral* of the Neck, it grows more thin and subtle.

Use,

This *Membrane* serves to defend the *Spinal Marrow* from any hurt from the Flexures of the *Vertebrae*, especially in the Neck, the *Vertebrae* of which are subject to a more frequent, and greater variety of Motions and Contortions, for which reason it is stronger there than elsewhere. It seems likewise to defend the *Spinal Marrow* from receiving any Injury on the hinder-part by Cold, to which on the fore-part it is not expos'd, and therefore does not

not so much want this Covering ; and lastly, it is suppos'd by compressing the Body of the *Spinal Marrow*, to promote the Expulsion of whatever is secreted there.

The Third, or Second proper Coat, is a Production of the *Membrana Arachnoides*, Arachnoides, or the Second proper Coat. and is a thin Pellucid Membrane lying between the *Dura* and *Pia Mater*, or the First and Third proper Membranes of the *Medulla*, to the latter of which, it adheres so closely on the fore-part and sides, that it is hardly separable from it, but easily enough on the hinder-part. This Membrane gives a Coat to the *Nerves* that go out of the *Spine*, which is the inner common Membrane of the *Nerves*, as that which comes from the *Dura Mater* gives the outer.

The Fourth and last Coat, or Third proper, Third proper Coat. is a continuation of the *Pia Mater*, and is an excessive Fine Transparent Membrane, strictly embracing the whole Substance of the *Medulla*, dividing it in the middle through the whole Tract, and making, as it were, two Columns of it.

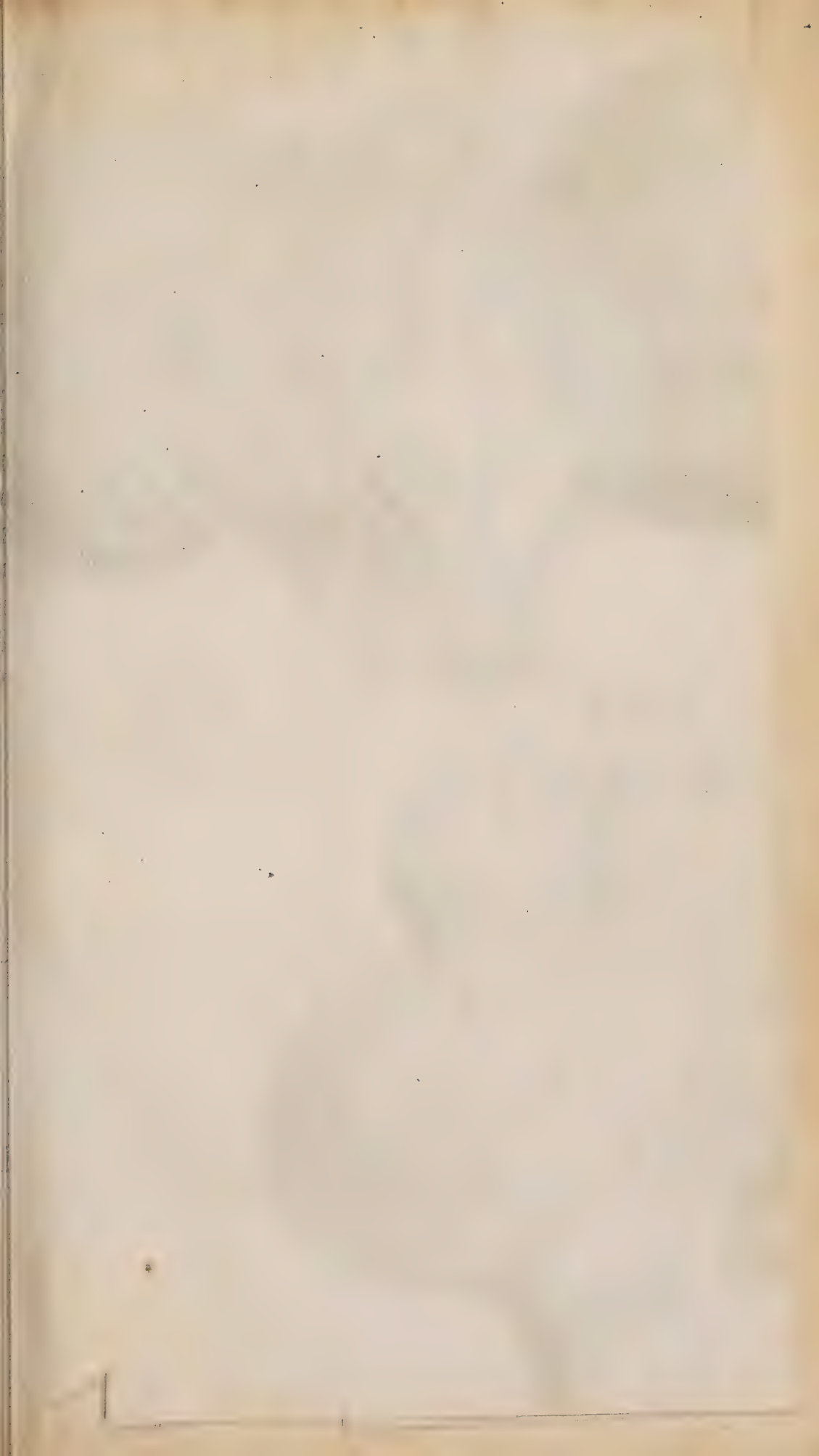
The *Vertebral Arteries* in their ascent to Vessels. the Brain, send off on each side, a Twig to every Juncture of the *Vertebrae* of the Neck, and after their joyning at the *Protuberantia Annularis*, send back again a Branch which running along the *Spinal Marrow* is call'd the *Spinal Artery*, and join'd at every

Arteries.
Tab. xv.

Vertebra above the *Heart*, by those *Twigs* already mention'd. Below the *Heart* the *Aorta* sends Branches to every Joint of the *Vertebrae*. All these piercing the Substance of the *Medulla*, and sending some *Twigs* to the *Arterial Trunk*, loose the rest in the *Caudex Medullaris*.

Veins,

The Blood is return'd by minute Ramifications of *Veins* into two Channels, which accompany the *Spinal Marrow* on each side thro' the whole Tract, and are call'd *Sine Venosi*, which send out their Branches to the Parts between the Head and the *Thorax* to the *Cervical Veins*; in the *Thorax* to the *Vena Sine Pari*, and below where the Trunk of the *Vena Cava* lies upon the *Spinal* immediately to the *Cava* it self.



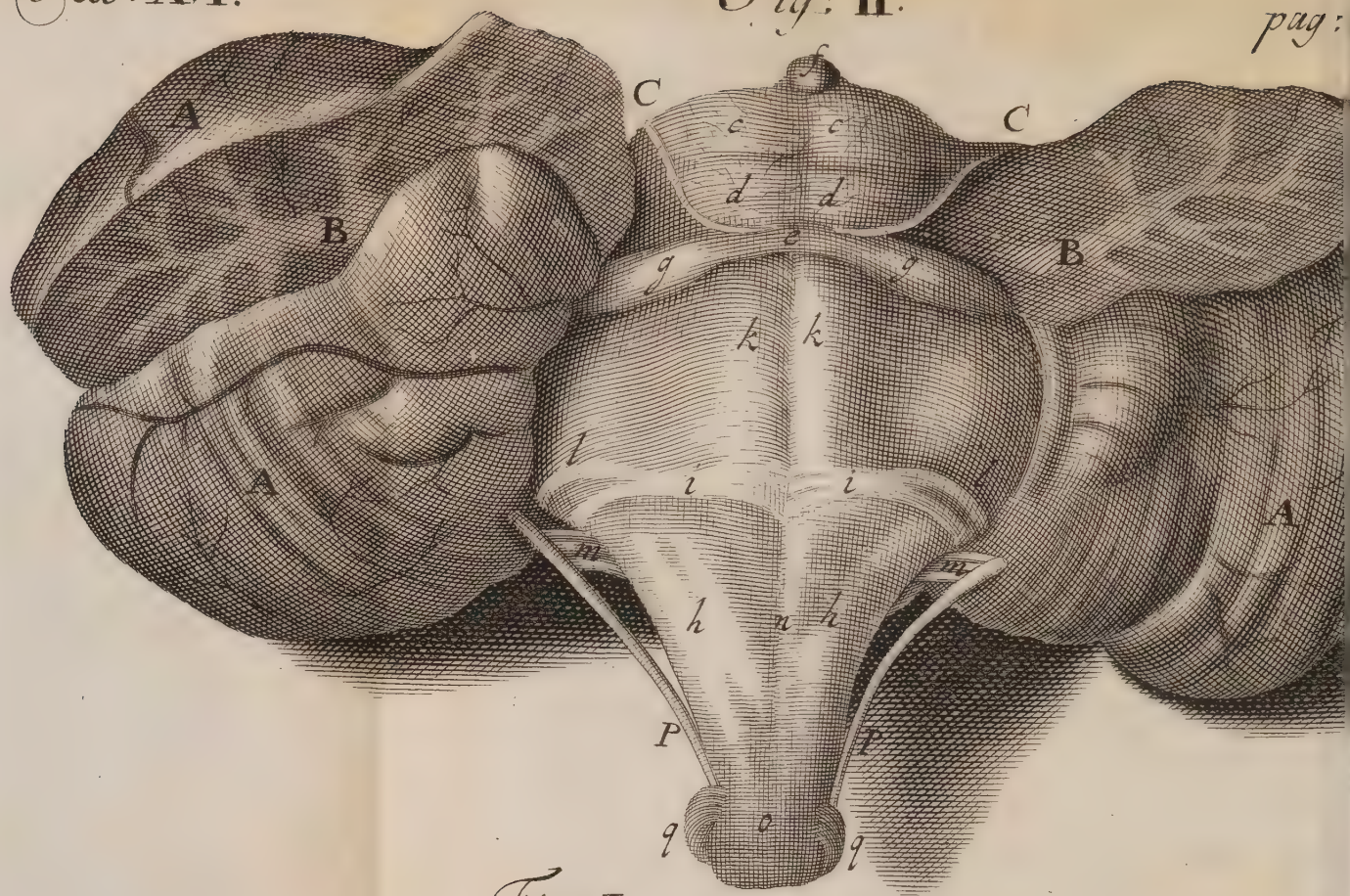
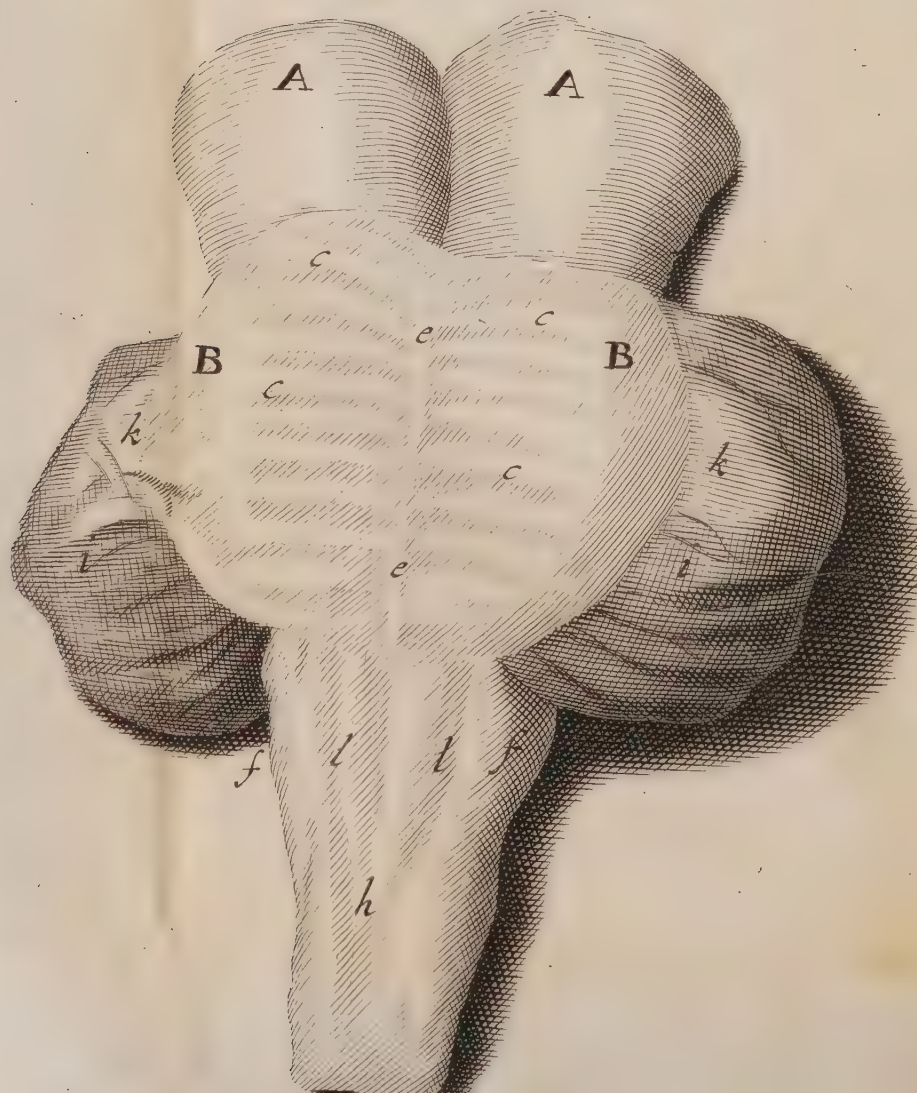


Fig: I.



T A B. XVI.

F I G I.

THE Annular Protuberance, and *Medulla Spinalis*, &c. cut through the middle, lengthway.

AA, The *Crura Medulla Oblongata*.

BB, The Annular Protuberance, or *Pons Varolii* divided.

cc, Its *Transverse Stria*.

ee, Its middle *Medullary Tract*, in which the *Stria* terminate on each side.

ff, The Third, or *Chordal Processes* of Dr. Willis.

h, The *Spinal Marrow*.

ii, Part of the *Cerebellum*.

kk, The Second Processes of the *Cerebellum*, which compose the Annular Protuberance.

ll, The *Cineritious* part of the *Medulla Oblongata*.

F I G. II.

THE *Cerebellum* cut through on its hinder-part, and reclin'd laterally.

AA, The *Cerebellum*.

BB, The *Arboreous Ramifications* of the *Meditullium*, of the *Cerebellum* appearing in this Section.

CC, The *Pathetick Nerves* at their *Origins*.

cc, The *Nates*.

dd, The *Testes*.

e, The *Transverse Process* where the *Pathetick Nerves* have their Original.

f, The *Glandula Pinealis*.

K k 4,

gg, The

gg, The first Process of the *Cerebellum*, running from it to the *Nates* here extended laterally.

hh, The Third, or *Chordal* Processes.

ii, The *Transverse Medullary* Process in the Fourth Ventricle, where the *soft* Branch of the *Seventh* Pair of Nerves has its Original.

kk, The *Medullary* Process descending from the *Transverse* Process behind the *Testes*, down to the other afore-mention'd *Medullary Transverse* Process.

ll, The Originals of the Process.

mm, The *Eighth* Pair of Nerves.

n, The *Calamus Scriptorius*, or extremity of the Fourth Ventricle.

o, The Spinal Marrow.

pp, The Accessory Nerves.

qq, The *Tenth* Pair of Nerves.

C H A P. VII.

Of the N E R V E S which have their Origine
within the S K U L L.

S Y L L A B U S

Nervorum oriundorum intra Caput, quorum
sunt.

Pars Decem	Par	Primum, Olfactorium ad Membranas Narium	} ad Oculos
		Secundum Opticum	
		Tertium Oculorum Motorium	
		Quartum Patheticum, seu Amatorium	
	Par	Oculos	App. Tab. xi. Fig. ii.
		Nares	
		Palatum	
		Linguam	
	Par	Maxillas	} ad
		Gingivas	
		Dentes, &c.	
		Quintum Gustatorium & Tactarium	
Pars Decem	Par	Sextum Gustatorium & Motorium	} ad
		Septimum Auditorium cujus Pars	
	Par	Dura	} Aures
		Mollis	
		Octavum seu Vagum ad Viscera unde	
Pars Decem	Par	Nonum Linguae Motorium	} Accessorium Recurrentes
		Decimum seu primum Cervicale.	

THE Nerves being the Off-spring of the Brain, Cerebellum, Medulla Ob-
longata, and Spinalis, the account of them
seems naturally to follow the preceeding.

They are, as has been already observ'd,
in Number Ten Pair, which arise within
the Skull.

The

First Pair
Tab. xv.

No. 1.

The *First Pair* is the *Olfactory*, whose appearance within the *Skull*, and *Exit* have already been describ'd. These, as soon as they have made their way through the *Os Cribrosum*, are distributed in the Membranes of the Nose only, which in Me being short and situate upon the *Os Cribrosum*, there is not much to be seen of it. Its use is for the Sense of Smelling.

Optick
Nerves.
Ib. 2.

The *Optick Nerves*, which are the next Pair, have almost as short a progress, being wholly spent upon the *Tunics* of the Eye of which the *Retina*, so call'd from its Resemblance of Net-work, is an Expansion of the inner or *Medullary* part of it only, and upon this the Impression of the *Objects* of *Vision* is suppos'd to be made. These *Nerves* pass out of the *Skull* through two Perforations in the *Basis* of the *Skull*, a little above the *Sella Equina*, near the fore internal Processes of the *Os Sphoenoides*, which lead directly to the *Orbits* of the *Eyes*. About the Trunk of these *Nerves* some Branches of the Third and Fifth Pair twine themselves, sending, probably, some Fibres to the Coats of it in their Process to the *Tunics* of the *Eye*.

Oculo-
rum Mo-
torii.
Ib. 3.

The *Third Pair* are call'd *Oculorum Motorii*. These arise from the *Crura* of the *Medulla Oblongata*, near the *Annular Protuberance*: Whence they march out between two Branches of the *Cervical Artery*, and passing out of the *Skull* at an irregular

irregular oblong hole, immediately underneath the former, is spent upon those Muscles of the Eye which are call'd *Attollent*, *Deprimant*, *Adducent* and *Obliquus Inferior*, except some small Fibres which go into the Muscle of the upper *Palpebra*.

App. Tab.
xv. Fig. 6.

The *Fourth-Pair* is the *Pathetick*, which rises behind the *Testes*, and passes out of the *Skull* at the same *Foramen* with the former Pair, and spends it self wholly upon the *Trochlear Muscle*.

Pathetici
Tab. xv.
No. 4.

The two first Pair of these Nerves serve only for Sense. The first for Smelling, the latter for Sight; the two latter serve for both Sense and Motion.

The *Fifth Pair*, which is the largest of all those that come from the Brain, has its use as well as distribution more extended, serving both for *Sense* and *Motion*, for *Touch* and *Taste*. It sends Branches not only to the *Eyes*, *Nose*, *Palate*, *Tongue*, *Teeth*, and almost all other parts of the *Mouth* and *Face*: But likewise into the *Breast* and *lower Venter*, by means of the *Intercostals*, which are partly compos'd of Branches of this Nerve.

Fifth
Pair.
Ib. 5.

It arises from the side of the *Protuberantia Annularis* near the *Processus Cerebelli*. It is at its Origine very large, but before its Egress from the *Dura Mater*, it is apparently divided into two Branches, consisting each of them of innumerable nervous

vous

vous Fibres, or Bundles of little Nerves of which those of one Branch are pretty tough and firm, the other soft and lax, and therefore it is divided into a hard and soft Branch. It is cloath'd with a Coat from the *Dura Mater*, and a little beyond the *Os Petrosum*, on each side of the *Sella Equina* forms a *Plexus*, which is call'd *Ganglioformis*, which receives small Branches of Arteries from the *Cervicals*, and sends both correspondent Veins to the *Lateral Sinuses*.

Division. Near the *Plexus Ganglioformis*, each of these Nerves is divided into an *Anteriour* and *Posteriour* Branch.

Anteriour Branch. App. Tab xv. Fig. 5. The *Anteriour* or fore-Branch, after having sent some Twigs into the *Dura Mater* is cover'd with a pretty thick Membrane, and enters the *Receptacle* on each side of the *Sella Equina*, where it sends off sometimes one, and sometimes two Twigs, which together with a Twig of the *Sixth Pair* sent off there likewise, end in the *Intercostal Nerve*; and as soon as it emerges from this *Channel*, it is again divided into three Branches pretty near equal.

Upper-Branch. The upper of these three Branches, which is somewhat the lesser, passing through the *Foramen Lacerum* to the *Orbit* of the *Eye*, is immediately sub-divided into three lesser Branches, of which the first having sent off a Twig to the *Tunica Adnata* of the *Eye*,
to

to the *Glandula Lachrimalis*, to the *Muscles* that draw the *Nose* upwards, to the *Eye-lids* and their *Orbicular Muscles*, running over the *Muscle*, which draws up the upper *Eye-lid*, is spent on the *Muscles* of the *Fore-head*, and the common *Integuments* of the fore-part of the *Head*.

The *Second Branch*, running under the *Second Patheticks* and *Motorii*, is again divided in- Second Branch. to two, of which the *lesser* and *outward slip* which regards the *lesser Canthus* of the *Eye*, sends off several *Fibrils* into the *Fat*, which envelops the *Optick Nerve*, and joining with others from the *Third Pair*, form a little sort of *Plexus* upon the *Trunk* of the *Optick Nerve* it self, from whence the *Fibrils* Plexus Ophthalmicus. proceeding thro' the *Fat*, which covers the hinder-part of the *Tunica Sclerotica*, end some of them in the *Musculus Deprimens*, others in the *Adducens*, and the rest in the *Tunica Sclerotica* it self.

The *inner*, which is the bigger *slip* of the *Second Branch*, is again divided into four *Twigs*. The first running over the *Optick Nerve*, against the great *Canthus* of the *Eye*, enters the *Tunica Sclerotica*, and is spent in the *Membrane*. The second, returning into the *Skull* by a peculiar *Perforation*, pierces the *Crassa Meninx*, to which it probably gives some *Twigs*, as the difficulty of separating it from it seems to argue, and sometimes turning back again, passes out of the *Skull*,

Skull through one of the holes of the *Cribriforme*, and is distributed into the *Inferiour Membrane* of the *Nose*. The third *Twig* goes towards the greater *Canthus* of the *Eye* and is spent partly on the *Eye-lids* and their *Orbicular Muscles*, upon the *Externa Integument* of the *Nose*, and the *Muscles* which draw it *upwards*. The fourth is distributed by several *Twigs* into the *Eye-lids* and the *Orbicular Muscles*.

Third
Branch.

The *third slip* of this *Superiour Branch* running under the Nerve of the *Sixth Pair* and the *Abducent Muscle*, is spent on the *Glandula Innominata* and *Tunica Adnata*.

Inferiour
Branch.

The *lesser Inferiour Branch*, before it goes out of the *Skull*, enters the *Orbit* of the *Eye* and running along the out-side of the *Musculus Abducens*, goes out again at a little *Poriforation* peculiar to it; after which being divided into several *Fibres*, some of which go to the *Integuments* of the *Cheeks*, and the rest to the *Muscles* that raise the *upper-Lip*. As soon as this Branch goes out of the *Skull* at the third *Foramen*, it is again divided into three little Branches, of which the first after having bestow'd some *Twigs* upon the *Musculus Masseter*, upon the *Teguments* of the *Face*, upon the *Gums* and *Teeth* of the *upper-Jaw*, enters a peculiar *Sinus* of the *Bone*, making the lower part of the *Orbit* of the *Eye*, and goes out at a hole particular to it, after which it is divided into several

several *Fibrils* which go to the *Teguments* of the *Face*, to the *upper-Lip*, to the *Muscle* which draws the lower-part of the *Nose* laterally, and to the *inner Muscle* of the *Nose*. The second small Branch running downwards behind the *Ducts*, which go from the *Nose* to the *Fauces*, is divided into *two*, of which the *upper* by many *Twigs* is distributed into the *Membrana Pituitaria*. The *lower* passing through a peculiar Hole on the *hinder* and *lateral* part of the *Bone* of the *Palate*, is distributed into that spongy *Flesh*, that lines the *Palate*, and the tough *Membrane* that covers it. The *third little Branch* is spent on that part of the *Membrana Pituitaria* which lines the *Fauces* upon the *Uvula*, and *Muscles* thereabouts, and upon the *Tonsils*.

The *Ramus Major* or *Posterior*, after having bestow'd some *Twigs* upon the *Dura Mater* receives a *Coat* from that, and the *Pia Mater* cloath'd, with which it passes out of the *Skull* through the *Fifth Foramen*, and having sent off some *Twigs* to the *Musculus Buccinator*, *Masseter*, and those of the *lower Jaw*, is divided into three considerable *Branches*.

The *first* of these being joyn'd by a *Twig* of the hard part of the *Auditory Nerve* from the *Barrel* of the *Ear*, goes to the *Root* of the *Tongue*, from whence proceeding forwards, it sends several *Twigs* to the *Max-illar*

illar Glands. From the *outer-side* it send likewise divers others, which, running along the *inner Substance* of the *Tongue*, end in *Capillars* at the *extremity* of it, and joining every where with the *Branches* of the *Ninth Pair*, serve both the *Muscles*, and the *Papillary Glands*, and therefore seem to contribute as well to the *Tast* as the *Motion* of the *Tongue*.

The *second* or *middle Branch* sending of first *one Twig*, which is distributed partly into the *Maxillar Glands*, and partly into the *Muscles Styloglossus* and *Myloglossus*, enters the *Sinus* or *Hollow* of the *lower-Jaw*, along which it runs, accompany'd with *Branches* of the *Carotid Arteries* and little *Veins* which return to the *Internal Jugulars*, and besides sending off a *Twig* to *each Tooth*, with the *Membranes* of the *aforesaid Vessels* contributes towards forming a *Membrane* which lines the whole *Sinus*. At the fourth *Molaris* or *Grinder*, it is divided into two *Branches*: The *lesser* of which runs on to the very *Commissure*, or joining of the *Jaw*. The bigger, passing out at a peculiar *Perforation*, is divided into several *Fibres*, which are dispos'd into the *Muscles* of the *lower-Lip*, and into the *Chin*.

The *Third* and *Exteriour Ramifications* of this greater and *posterior Branch* is spent upon the *Parotid Glands*.

The

The *Sixth Pair* of Nerves rise from the *Medullary Tracts* of the *Centrum Ovale*, just below the *Processus Annularis*, and proceeding forwards enter the same *Receptacle* or *Sinus* of the *Skull*, on the side of the *Sella Equina*, as the *Fifth Pair* does, where sending off a *Twig* consisting sometimes of two, sometimes of three *Fibres*, which joining those of the *Fifth Pair*, before mentioned, go to the *Intercostals*, it goes out of the *Skull* at the same hole with the *Oculorum Motorii*, and ends in the *Abducent Muscles* of the *Eye*. Besides which it sends some small *Twigs* to the *Tongue*, and therefore is reckon'd among the *Gustatory Nerves*.

The *Seventh Pair* or *Auditory Nerves*, pass out of the *Skull* through a hole of the *Os Petrosum*, which is the *Seventh Perforation*. They arise from the *Medullary Tract* of the *Fourth Ventricle*, and emerge behind the *Processus Annularis* near the *Eighth Pair*, with which the soft part of it joins. As soon as it is passed out of the *Skull*, it is divided into two *Branches*, a *hard* and a *soft* one, which immediately part; the *hard* entering a little *Sinus* in the upper-part of the *Bone*, which constitutes the *Barrel* of the *Ear*, where it sends off a *Twig* which turning towards the fore-part of the *Skull*, goes out of the *Os Petrosum*, and is distributed into the *Dura Mater*, except some small *Twigs* which go to the *Mem-*

The Sixth
Pair.
Tab. xv.
No. 6.

Seventh
Pair, or
Auditory
Nerves.
Ib. No. 7:
Tab. xvi.
Fig. ii.

brane which lines the *Barrel*, to the *Internal Muscles* of the *Ear*, and to the fine *Membrane* that cloaths the inside of the *Cavity* of the *Apophysis Mamillaris*. After this the *hard Branch* sends off two other *Twigs*, one of which joins the *Nerves* of the *Eighth Pair*, a little above its *Plexus Ganglioformis*; the other goes to the *Tympanum*, of which it makes the *Chord*, and creeping over the handle of the *Malleolus* goes out of the *Ear*, and runs downward between the *Musculus Pterigoidæus Internus* and the *Tongue*, into which latter it sends a *Ramification*, which joins with a *Twig* of the *Posterior Branch* of the *Fifth Pair* before describ'd.

Besides these, the *hard Branch* coming out of the *Processus Mamillaris*, sends some *Twigs* to the *Musculus Masseter* and other to the *Glands* about the *Ear*, where being divided into two other *Ramifications*, the *Interiour* of these having first bestow'd some *Fibres* upon the *Glands* themselves, turns off towards the *Cheek* and is divided into several *Fibrils*, of which one, joining with another belonging to the *Fifth Pair*, goes to the *upper-Lip*. The rest are spent on the *lower Palpebra*, and upon the external part of the *Face*.

The *Exteriour Ramification* of this *hard* part, after having likewise bestow'd some *Fibrils* upon the *Glands*, out of which it
issues

issues, is divided into two other Ramifications, the *upper* of which is distributed into the *Musculus Quadratus* of the *lower Jaw*, and outer part and Muscles of the *lower Lip*. The *lower* Ramification is spent upon the *Integuments* of the *Fore* and *Lateral* parts of the *Neck*, upon some *Muscles* of the *lower Jaw*, and upon the *Muscle Mastoides*.

The *soft Branch* of the *Seventh Pair* is larger than the *hard*, altho' it seems to consist of fewer Fibres. It is divided into three Ramifications, of which the *superior* passes thro' a small *Foramen* peculiar to it into the *Concha* of the *Ear*, where it expands its self, and forms a very fine Membrane, which lines all the inner Surface of it. The *second* and *third* Ramifications go likewise to the inner-part of the *Concha* and *Semicircular Ducts*, which they furnish with Membranes that are the immediate *Instruments* and *Organs* of *Hearing*.

The *Eighth Pair*, by the *Ancients* esteem'd the *Sixth*, is both by *them* and the *Moderns* call'd *Par Vagum*. These spring from the *Medulla Oblongata* a little above the *Corpora Olivaria*, and pass out of the *Skull* through the same Perforations, with the *Lateral Sinuses* of the *Dura Mater*. Along with them, wrap'd up in the same Coat from the *Dura Mater*, passes a *Pair* of *Nerves* which has its *Origine* from the *Medulla* contain'd in the *Vertebra* of the *Neck*, and is call'd *Par* *Accessorium*,
Par Vagum, or Eighth Pair. Tab. xv. No. 8.
Par Accessorium

App.
Tab. xvi.

Plexus
Ganglio-
formis
Superior.

Inferior.

Recur-
rents.

Accessorium, which soon after its return out of the *Skull* leaves the *Par Vagum* again, and is distributed into the *Muscles* of the *Neck* and *Shoulders*. Besides it is join'd by a *Twig* of the *hard* part of the *Seventh Pair*, and at the *second Vertebra* of the *Neck*, by the *Nerves* that issue from the *Cervical Marrow* there, and sends forth several *Twigs* to the *Muscles* of the *Larynx*, *Gula*, *Neck*, and the *Parts* thereabouts, especially from a *Ganglioform Plexus*, form'd by its union with a *Branch* of the *Intercostal*. After this descending along the *Trunk* of the *Aspera Arteria* to the *Thorax*, it makes another *Plexus* immediately under the *Clavicle*, from which *Plexus* on the right side the *Recurrent Nerve* on that side, has its *Rise*, tho' on the *left* it springs from the *Trunk* of the *Nerve* it self. The *right Recurrent* is reflected at the *Axillary Artery*, and the *left* at the *descending Branch* of the *Aorta*, and both run up along the sides of the *Trachea*, to which they impart some *Twigs*, and end at last in the *Muscles* of the *Larynx*. These serve for the *Formation* and *Modulating* of the *Voice*, as appears by a *Dog's* not being able to *Bark* after they are cut.

Over against the *Origine* of the great *Artery*, it sends off a considerable *Branch* towards the *Heart*, which splitting it self presently into two, the lesser *Branch* twists about

about and embraces the *Pulmonary Vein*, the bigger joining with that of the opposite side goes to the *Pericardium*, and the substance of the *Heart* and its *Auricles*, after having sent off one Twig, which joining with others from the Trunks of the *Inter-costals*, makes the *Plexus Cardiacus Superior*, which sending out one Branch, which strictly embraces the *Pulmonary Artery*, bestows the rest upon the Heart it self.

App.
Tab. xvi.

Plexus
Cardiacus
Superior.

Proceeding yet farther, it sends out divers Ramifications, which meeting again together, make the *Plexus Pneumonicus*, from which many Nervous Fibres are sent out, which embrace and constringe the Vesicles and Vessels of the *Lungs*, as well those of *Air* as of *Blood*, which they variously enfold and twine about.

Plexus
Pneumonicus.

In its passage downwards, it distributes several Branches to the *Oesophagus*, along which it runs. About the lower *Vertebrae* of the Back, the Trunk is divided into two Branches call'd the *External* and *Internal*, which communicate with each other by the concurrence of several Ramifications. But afterwards these two principal Branches join again, the *Internals* of each side with one another forming one Trunk, and the *Externals* by their communication forming another, and passing the *Diaphragm* they are spent upon the *Stomach*, especially its upper Orifice. The remainder of this Pair

L 1 3

joins

App. Tab xvi. joins with the *Intercostals* in the Formation of several *Plexus* in the lower *Venter*, and in them it seems to terminate.

Intercostals.

The Trunk of the *Intercostal Nerve* consists of Nervous Filaments deriv'd partly from the Brain, which are the Branches of the *Fifth* and *Sixth Pair*, (whose Coalition in a *Sinus* of the *Skull* near the *Sella Equina*, we have already taken notice of) and partly from the *Spinal Marrow*, by those Branches which they receive from the *Vertebral Nerves*. In each Trunk of these Nerves before it arrives at the *Thorax*, are two *Plexus Ganglioformes*, call'd *Plexus Cervicales*, the upper of which receives a Branch of a Nerve from each Trunk of the *Par Vagum*, and is situate just at the egress of the *Skull*. The next *Plexus* is about the middle of the Neck, and sends out divers Ramifications to the *Oesophagus* and *Aspera Arteria*, and one larger than the rest to the *Recurrent Nerve*. From this *Plexus* likewise, descend two pretty considerable Ramifications to the *Cardiac Plexus*, which are join'd a little lower by a third.

Plexus Cervicales.

From this second *Plexus* the *Intercostal Trunk* descends to the *Clavicles*, where being split into two, it embraces and constricts the *Subclavian Artery*. Thence entering the *Thorax* it receives three or four Twigs from the upper *Vertebral Nerves* together with which it constitutes the *Plexus*

Truncus Intercostalis.

Inter

Intercostalis, and from thence descends along the sides of the *Vertebrae*, receiving a Nervous Twig from every one of them to the *Os Saerum*, and coming into the *Abdomen*, it forms several considerable *Plexus*, which are the *Lienaris*, *Hepaticus*, the two *Renales*, *Mesentericus Magnus*, and two little ones in the *Pelvis*.

App.Tab
xvi.

Several
considera-
ble Plexus

After this has reach'd the *Abdomen*, it sends off on each side a considerable Branch call'd by *Willis*, *Ramus Mesentericus*, out of which the afore-nam'd *Plexus* are form'd. This Branch is divided into two others, of which the bigger turning towards the *Stomach*, forms a *Plexus*, from which come four *Fasciculi* or Bundles of Fibres to the *Stomach*, to the *Spleen*, to the *Hepatick Plexus*, and the great *Plexus* of the *Mesentery*.

Ramus
Mesente-
ricus.

Upon the right side the *Mesenteric Branch* is sub-divided into two (as is that of the left likewise) the Superior of which makes the main part of the *Plexus Hepaticus*, from whence proceed a great number of Nerves to the *Liver*, strictly embracing, as it were with a kind of Net-work, the Blood-Vessels, and sending out their respective Ramifications to the *Gall*, *Bladder*, and *Biliary Ducts*, and likewise to the *Duodenum*, *Pylorus* and *Pancreas*. This *Plexus*, by means of some Ramifications, communicates with the *Plexus Lienaris*, (which is form'd out of

Plexus
Hepati-
cus.

Lienaris.

App. Tab. xvi. the Branches of the left *Intercostal*) and likewise with the *Mesentericus Magnus*, and *Renalis Dexter*.

Plexus Renales. The lower Branches of the *Mesenterics*, near the *Capsula Atrabilaria*, form the *Plexus Renales*, from whence several Nervous Fibres go to the *Kidnies*, which accompany, and involve the Blood-Vessels, as in the *Liver*.

Mesentericus Magnus. The Great *Mesenteric Plexus* is form'd out of the concurrent Branches of several other *Plexus*, and sends it Nervous Fibres through the whole *Mesentery* along with the *Mesaraic Vessels*, which, with various Circumlignations, they accompany to the *Intestines*. Other Branches it sends to the Trunk of the *Aorta Descendens*, and to the *Ovaries* in Women.

Plexus Infimus Abdominus. A little below the *Kidnies*, the Trunk of the *Intercostals* verges a little inwards, and descends into the *Pelvis* to the *Os Sacrum*, about the beginning of which, together with the *Vertebral Branches*, it makes the lowest *Plexus* of the *Abdomen*, from whence a tolerable Branch being reflected a little upwards, make near the former, another little *Plexus* which is the least of all.

Minimus. From these two *Plexus* a Branch is return'd to the great *Mesenteric Plexus*, which in its way visits the *Intestinum Rectum* and *Colon*. Another Branch descends from the
lower

lower Plexus behind the *Intestinum Rectum*, to which all along it gives several Twigs. The remainder, having sent off some Ramifications to the *Ureters*, proceeds downwards to the *Sphincter Ani*, into which, and the Neighbouring parts, it is distributed.

The *Ninth* and *Tenth Pair* are already spoken to, as far as is necessary, in the Account of the *Brain*.

C H A P. VIII.

*Of the Nerves from the Spinal Marrow.*Spinal
Nerves.

BESIDES those *Ten Pair* which arise from the *Medulla Oblongata* within the *Skull*, there are *Thirty* other *Pair* of *Nerves*, which springing from the same *Medulla*, after its *Egress* out of the *Skull*, are call'd *Spinal Nerves*, because of the change of Name which the *Medulla* undergoes immediately upon its *Exit* from the *Skull*.

Division.

Of these *Thirty Pair* *Seven* are reckon'd to the *Neck*, *Twelve* to the *Dorsum*, or *Back*, *Five* to the *Loins*, and *Six* to the *Os Sacrum*. These, according to their several *Originations*, or *Places* whence they take their *Rise*, are call'd *Cervicals*, *Dorsals*, *Lumbals*, and *Nerves* of the *Os Sacrum*.

Cervical
Nerves.

The *First Pair* of *Cervical Nerves*, arise betwixt the *First* and *Second Vertebra* of the *Neck* (for those that have their *Exit* between the *Bone* of the *Occiput* and first *Vertebra*, are reckon'd the *Tenth Pair* of the *Brain*) and contrary to the rest, come out before and behind, whereas the other *Six Pair* come out laterally from the *Juncture* of the *Vertebrae*, thro' particular *Perforations* near the transverse *Processes*.

Th

The *First Pair* of *Cervical Nerves*, goes to the Muscles of the *Head* and *Ear*. First Pair.

The *Second*, according to *Dr. Willis*, contributes the main Branch towards the Formation of the *Diaphragmatick Nerves*, which according to *Vieussens*, spring only from the *Fourth* and *Sixth Pair*. The Second.
Diaphragmatick Nerves.

The *Three* last Pair of the *Neck* joining with the two *first* of the *Dorsum*, or *Thorax*, make the *Brachial Nerves*.

All the *Cervical Nerves* send innumerable Branches to the Muscles, and other parts of the *Head*, *Neck* and *Shoulders*.

The *Dorsal Nerves*, besides what the two upper Pair contribute to the *Brachial Nerves*, are for the most part distributed into the *Intercostal* and *Abdominal* Muscles, the *Pleura* and *External* parts of the *Thorax*. Dorsal.

The *First Pair* of the *Lumbal Nerves*, sends from each side a Branch to the lower side of the *Diaphragm*. The *Second* sends some Twigs to the *Genital* Parts: Besides some from this as well as the three following Pair, which gives the first Roots to the *Crural Nerves*. The rest of the Branches of the *Lumbal Nerves* are distributed into the Muscles of the *Loins* and adjacent parts. Lumbal Nerves.

The first *Three* or *Four Pair* of the *Nerves* of the *Os Sacrum*, are bestow'd entirely upon the *Crural Nerves*. The rest upon the Muscles. Nerves of the Os Sacrum.

Muscles of the *Anus, Vesica* and *Genita* parts.

**Brachial
Nerves.**

The *Brachial Nerves*, which are the offspring partly of the *Cervical*, and partly of the *Dorsals*, after the several Branches which they are compos'd, have been variously complicated and united, run but a little way in a Trunk before they divide again into several Branches, which are variously distributed into the Muscles of the *Skin* and *Arms*.

**Diaphragmatic
Nerves.**

The *Diaphragmatic Nerves*, which are likewise the offspring of the *Cervical*, after joining in a Trunk, run thro' the *Mediastinum* undivided, till they arrive near the *Diaphragm*, into which they send off diverse Branches, some into the Muscular, others into the Tendinous part of it.

**Crural
Nerves.**

The *Crural Nerves*, which consist of an union of *Six* or *Seven* Pair, viz. the three last of the *Lumbal*, and *three* or *four* first of the *Os Sacrum*, after having spent their upper Branches upon the Muscles of the *Thigh* and the *Skin*, as far as the *Knee*, proceed in a Trunk downwards which sends its Branches to the extremities of the *Toes*, supplying as it goes, the Muscles and Skin of the *Leg* and *Foot*. This is the largest and firmest Nervous Trunk in the whole Body.

C H A P. IX.

Of the FACE.

TH E *Face* it self, as to its external Figure, is so well known to every body, that it needs no Anatomical Description or Division. For tho' it be the part the most regarded, as well by the Judicious as Voluptuous part of Mankind, for Information as well as Pleasure; and tho' we be thence inform'd in many cases, not only of the Passions of Mens Minds, but the Distempers of their Bodies likewise, yet it affords but little Matter for *Anatomical* Speculation, which will be more properly handled in the Description of the several Parts, which being to be distinctly treated of, we shall refer them thither.

C H A P.

C H A P. X.

Of the N O S E.

By Mr. William Cowper.

S Y L L A B U S.

Partium quæ maxime notantur circa

Nasum

Dorsum

Spina

Ala, seu Pinna

Orbicularis

Nares

} Exterius

Musculi	{	Elevatores	}	Ala
		Dilatatores		
		Constrictores		

Ossa	{	Communia	Parietalia	}	Eorum Cartilaginea
			Septum		
		Propria	Turbinata		
			Vomer		

Cavitates

Foramina

Membrana Pituitaria

Nervi Olfactorii

Nervi Paris Quinti.

THE Nose has been usually divided into *Internal* and *External*, which Division I mention, because it is constant four

found in the Writings of *Anatomists*, though it be of no great Importance.

It is again sub-divided into several parts, ^{External} *Parts* which make up its *External Figure*, of which the first is the *Dorsum*, or Ridge, running along the whole length of it. In which ^{Dorsum} *Nasi*. one part, (in those we call *Roman Noses* especially) about the middle is more *prominent* than the rest, and is call'd the *Spine*, and the extremity, which in many is turn'd round, is nam'd the *Orbiculus*, or *Tip* of the *Nose*, the sides are call'd the *Alæ* or *Pinnae*.

The Teguments of the *Nose*, which are ^{The Mus-} *Muscles of the* common to it, and other parts of the *Face*, ^{Nose.} being remov'd; the *Muscles* of the *Alæ* ^{Elevato-} *Nasi* appear: The first of these is of a *Pyramidal Figure*: It is very narrow, though ^{res Alæ} *Nasi*. fleshy, at its *Origination* on the *Fourth* ^{Tab.xviii} *Bone* of the upper *Jaw*, near the *Foramen* ^{Fig. i.} *Lachrymale*, and upper-part of the *Nose* by the great *Canthus* of the *Eye*, and becomes very broad and thin at its fleshy *Termination*, on the side of the *Ala Nasi*. When it acts it pulls the *Ala* upwards and turns it outwards.

The next *Muscle*, or *Pair of Muscles*, are ^{Dilatato-} *Muscles* common to the *Alæ Nasi* and upper *Lip*. ^{res Alæ} *Nasi*. They arise thin, broad and fleshy from the ^{Tab.xviii} *Cheek Bones* under the *Orbits* of the *Eyes*, ^{Fig. ii, iii.} and descend obliquely with a two-fold order of fleshy *Fibres* in each *Muscle*, which

part-

partly terminate in the upper *Lip*, and partly in the *Alæ Nasi*. These draw the *Alæ* from each other, and widen the External openings of the *Nostrils*.

Constrictores

Alæ Nasi.

Tab. xviii

Fig. iii.

The *Third Pair* are also common to the *Alæ* and upper *Lip*. They arise fleshy from the fore-parts of the fourth Bone of the upper *Jaw*, immediately above the Gums of the *Dentes Incisorii*, and are soon inserted after a straight ascent to the Roots of the *Alæ Nasi* and Superior parts of the upper *Lip*. These draw the *Alæ* downwards nearer each other, and at the same time draw the upper *Lip* also downwards, which action we use when we take Snuff, or endeavour to receive any Odoriferous *Effluvia*.

The frame of the *Nose* is mainly supported by two Bones, which end in Cartilages of a Triangular Figure, and are divided in the middle by a Third into two Partitions; called the *Nostrils*; this *Septum* ends likewise in a Cartilage, by means of which Cartilages the lower part of the *Nose* is render'd movable, which the upper that is perfectly *Osseus* is not.

Tab. xvii.
Fig. i, ii,
iii.

The *Cartilages* of the *Ala Nasi* are ty'd to those at the extremities of the two Bones of the *Nose* by *Ligaments*, which loose Connexion renders them movable. Professor *Ruysh* (*Epist. Anatom.* 8) tells us of two Pair of Cartilages more that belong to this part,

part, which are not existent in all, or in most Bodies, and if there ever were such, must be look'd upon as a *Lusus Naturæ*.

The Bones of the *Nose* are either *proper* Bones of the Nose, or *common*. The *proper* are such as are only common subservient to the use of the *Nose*: The *common* and proper. help to frame the *Foramina Narium*, as well as the Neighbouring parts.

The first of the *proper* Bones of the *Nose* 1st. proper Bones. are the two external ones, mention'd above, Tab. xviii Fig. i. H. that constitute the *Dorsum Nasi*; they are the most solid of all the Bones of this part, and are join'd to the *Ossa Frontis*, fourth Bone of the upper *Jaw*, and to each other per *Harmoniam*, but in some Subjects per *Suturam*, especially at the *Ossa Frontis*, and Fourth Bone of the upper *Jaw*: They are each of a *Quadrangular* Figure; their lower parts that are joined with the Cartilages of the *Ala* are uneven; they have each a remarkable Aperture externally, for the *Blood Vessels*, from which, Branches pass to the *Glandulous Membrane*, that cleaves to the insides of these Bones, which are furrow'd; Their out-sides are smooth.

In the Concave of the Arch of those two Bones, at their union with each other internally, is plac'd the bony part of the *Septum Narium*. Its upper-part joins with the *Os Ethmoides*; but in *Adults* is continued, so that the *Os Ethmoides* and its Process, call'd *Crista Galli*, appear to be one intire Bone with this *Septum*. 2d. proper Bone call'd Septum. Ib. Fig. v. C. 11.

Crista
Galli.
App. Tab
49. Fig. 3.

tum. It is thinnest in its middle, where there are frequently found some irregular inequalities, and divides the right Nostril from the left: Tho' its Position is seldom found Perpendicular, but commonly inclines to one side or t'other variously in different Bodies; Its upper-part (continued from the *Ethmoides* to the *Os Sphenoides*) is thickest, but soon becomes very thin towards the *Fauces*, or back-part of the *Foramina-Narium*. This *Septum* is capt with another thin Bone, call'd *Vomer Aratri*, from its Figure. The lower-part of this *Septum* is join'd to the Internal and Superior Surface of the Fourth Bone of the upper-Jaw, that makes the Roof of the *Mouth*, and backwards again to the *Ossa Palati* by Harmony.

Vomer.
Tab. xviii
Fig. i. N.

Ossa Tur-
binata
feu
Spongio-
sa.
Tab. xvii
Fig. iv. I,
K.

The other *proper Bones* belonging to the *Nose*, are call'd *Turbinata* and *Spongiosa*. There are commonly found two of these Bones in each Nostril, placed one above the other; in some Subjects you'll find three; The two lower-most are never wanting in a natural State; The upper-most, that seems to be a part of the *Os Ethmoides*, is very irregular, and is but rarely seen; The middle-most, which is always the largest when there are three, cleaves to the side of the *Fourth Bone* of the upper-Jaw, that is next to the *Foramina Narium* of the same side, which part of the *fourth Bone* of the upper-

Jaw,

Jaw, makes the *Internal Paries* of the *Antrum Maxilla Superioris* next to the *Foramen* of that Nostril. This *Os Turbinatum* is so placed as to shelter or cover the Perforation of the *Antrum* into the Nostril, and prevents the sudden rushing in of Air from the Nostril into the *Antrum*.

The third and lower-most *Os Turbinatum* in Adults, is not distinguish'd by any *Structure* from the sides of the *Antrum Maxilla*, but seems to be a Production of the *Antrum* turning down towards the *Os Palati*, and Internal Surface of the *fourth Bone* of the upper-Jaw, that makes the Roof of the Mouth. Ib. K.

All these *Ossa Turbinata* are very Porous, and are turn'd not unlike the shell of the *Concha Veneris*.

In *Quadrupeds*, especially large ones, these *Ossa Turbinata* are not only numerous, but very thin and large, and some of them are turn'd up not unlike to a piece of Paper rowl'd up to make Portable, so as to prevent Folds.

The *Common Bones* of the *Nose*, are such as make Fences for the *Foramina Narium*, and help to compose the parts adjacent: Common Bones. The largest of these, is what first offers it self to our sight, which we have had occasion so often to mention by the Title of the *Fourth Bone* of the upper-Jaw, which is particularly describ'd among the Bones of Ib. K.

Tab. xviii
Fig. i. III.

that part, and which indeed it has the greatest share in framing the *Foramina Narium*. The External bony part of the *Foramina Narium* is fram'd by those Bones on both sides, except in the upper-part, which is supported by the two first proper Bones of the *Nose*, as abovesaid. These *Fourth Bones* of the upper-Jaw, with the *Septum* and *Ossa Turbinata*, chiefly frame the *Internal Paries* of the *Foramina Narium* : In the upper-part a Portion of the *Os Frontis*, the in-side of the *Os Unguis*, the *Os Cribriformum*, with part of the *Os Sphenoides* ; And backwards towards the *Fauces*, the *Ossa Palati* help to compose the *Foramina Narium*.

Besides the Cavities, circumscrib'd by the Bones now mention'd, the *Foramina Narium* have divers collateral Cavities that open into them.

The upper-most of these Cavities is found in the *Os Frontis* ; this is commonly taken notice of, because it is so frequently seen in dividing the *Skull* to take out the *Brain*. In those Bodies, where they are found, (for in some they are not existent) they are placed in the lower and middle part of the *Os Frontis*, between the *Eye-brows* ; That of the right being divided from the left by a bony *Septum* ; In some Subjects they are very large, and extended over the *Orbit* of the *Eyes*, in whom we see the *Eye-brows* very

App. Tab
49. Fig. 3.

ry Prominent : Each of these open by small Ducts into the upper-parts of the *Foramina Narium*, under the Superior *Os Turbinatum*. Besides these, in that part of the *Os Frontis*, that is contiguous to the *Os Unguis* in the Orbit of the Eye, there are divers irregular Cells, which also open into one another, and into the *Foramina Narium* and *Antrum Maxillæ Superioris*. Backwards these Cells also open into the Cavity of the *Cella Sphenoidis*. These Cells are not (at least commonly) taken notice of by *Anatomists*.

Tab. xvii.
Fig. iv. G.

The next considerable Cavities that communicate with the *Foramina Narium*, are in that part of the *Os Sphenoides*, that frames the *Sella Equina*. These Cavities are very large, and that of the right side is divided from the left by a bony *Septum*. This *Septum* is not always in the middle, so that these Cavities are irregular, as to their Magnitude and Figure.

When the bony *Septum* happens to divide them equally, as in a Subject now before me, they are each about three quarters of an Inch in length, and more than half an Inch in breadth: In another Subject the *Sphenoidal* Cavity of the left-side is more than twice as big as the right, and their *Septum* inclines to the same side with the *Septum Narium* of the same Subject. They have each an opening into the *Foramina*

Narium, under the *Os Turbinatum Superius*. Neither these Cavities of the *Os Sphenoides*, nor those large ones of the *Cheeks* are found in a *Fœtus*, but instead thereof an *Osseous Meditullium* only possesses these parts, not unlike the *Diploe* of the *Cranium*.

Tab. xviii
Fig. i. K.

The largest and last Cavity we shall mention belonging to each of the Nostrils is by *Casseri* call'd *Antrum Genæ*; Dr. *Higbmore* calls it *Antrum Maxillæ Superioris*. It is fram'd in the *Fourth Bone* of the upper-Jaw, between the lower Margin of the Orbit of the Eye, and *Dentes Molares* of the same side. Backwards the thin bony *Paries* of this Cavity with the *Os Sphenoides*, make the *Foramen Lacerum Externum*. This Cavity is near two Inches in length from the fore part backwards, and exceeds an Inch from its Superior to its Inferior Surface; Its Figure inclines to a Triangular, with very obtuse points: To discover it fairly, divide the Bone with a *Saw* or *Chizel* near the *Dentes Molares* of the upper-Jaw, and you presently break into this large Cavity, the Magnitude of which will a little surprize one who has not been conversant in these matters: The lower Surface of this Cavity makes a thin covering to all the Roots of the *Dentes Molares*, as well as the *Dens Caninus* of the same side, and is very thin, and frequently upon drawing any
Tooth

Tooth, to which it sticks, taken along with it, whereby this Cavity is open'd into the *Alveolus*, and consequently into the *Mouth*. An Instance of this is mention'd by Dr. *Highmore* in a Gentlewoman, who had the *Dens Caninus* drawn upon the account of Pain, proceeding from an Inveterate Defluxion of sharp Humours that had destroy'd most of her *Teeth*; who upon thrusting a Silver Bodkin into the *Aveolus*, was exceedingly frighted to find it pass, as it did, almost to her *Eyes*. And upon further Trial with a small Feather stript of its Plume, which she thrust up a Hands breadth or more, was so terrify'd at it as to consult the Doctor and others about it, imagining nothing less than that it had gone to her *Brain*: But they considering the Circumstances of the matter, found that the Feather had doubled only in this Cavity, and gave the Lady full satisfaction in that point. The Doctor has given us a Figure of it, tho' no very exact one. Of this I have met with frequent Instances where the Patients have all done very well again, and the Aperture it self closed after Injecting a proper Medicine to cleanse the *Antrum* from any offensive Humour.

This Cavity or *Antrum Genæ* has a Communication, as the rest have with the *Foramina Narium*, with this difference, whereas those are less Cavities, and all plac'd above the lower parts of the *Foramina*, and

Tub. xviii
Fig. i.

have large openings into the *Foramina Narium* from their lower-parts; Those of the *Cheeks* are the largest of any about the *Nose*, and have lesser Aperture whereby they communicate with the *Foramina*; and these Small openings here, are placed in the upper-parts of these Cavities tho' the lower-parts of them are even with the lower-parts of the *Foramina Narium*; by all which it appears with what difficulty any peccant Humour lodg'd in either of these Cavities, can be discharg'd by the *Foramina Narium*, since these Cavities must either be fill'd to the top ready to run over first, or the Head must be held down to procure the discharge. This induced me to put in practice an Operation in the Cure of an *Ozena*, which appeared reasonable to me by the Structure of the Part, I being convinc'd it might be done without hazard to the Patient. After the fore-most *Dens Molaris* was taken out, and not finding an Aperture from its *Alveolas* into this *Antrum*, which in other Instances I have seen happen, with a convenient Instrument I bor'd the hole of the *Alveolas* through into the *Antrum Genæ*, whereby the *Pus*, which before lay in the *Antrum* readily ran out, and the Medicines that were daily injected by this Aperture, pass'd into the Nostrils, whereby the Patient was Cured, tho' this Disease had continued with

with a vast flux of stinking Matter daily from the *Nose*, for more than Four Years before this Operation.

I need not tell you how so much Matter could flow from this Cavity, when you consider, that not only these Cavities of the Cheeks, but all those of the *Nose*, mention'd above, as well as the *Ossa Turbinata*, *Septum Narium*, &c. are invested with a Membrane furnish'd with large *Arteries* from the *Carotides* and *Veins*, that empty themselves into the *Jugulars* and *Nerves*, from the *Par Quintum*, as well as the *Olfactory Nerves*. In this Membrane are a great number of small *Glands* placed very near each other. In an *Oxes-Head* you may perceive the Orifices of their Excretory Ducts, by the appearance of the *Mucus* they discharge on pressing this Membrane with the back of a Knife, &c. From these *Glands* flows all that *Pituita* that is commonly discharg'd at the Nostrils.

The Pituita separated

By small Glands.

How seen.

The Use of this *Pituita* is to keep the Membrane soft, and defend it from the Injuries of Extraneous Bodies, especially those in the Air, which must pass this way in Inspiration, when the *Mouth* is shut. By this means the *Olfactory Nerves*, expanded on this Membrane, are render'd capable of the perception of Odoriferous *Effluvia*, which otherwise the dryness of the part would destroy.

The use of the Pituita.

By

By this *Plan* we may guess the design of Nature, in framing so many Cavities, turnings and windings in the *Foramen Narium*, is to expand the *Olfactory Nerve* in so small a compass, which are every where distributed in *them*, but particularly on the *Ossa Turbinata*: And that Smelling is no otherways performed, than that by Inspiration on the Odoriferous *Effluvia* of Bodies are brought to a Contact with the *Olfactory Nerves*.

Besides this use of the *Nose*, which is the principal, Nature has made it, as were, a *Diverticulum* to the *Eyes*; for there is a considerable passage into each Nostril, that empties it self under the middle *Ossa Turbinata*, which arises from two Apertures call'd *Puncta Lachrymalia*, at the great *Catharus* of each *Eye*. By this way the superfluous moisture of the *Eyes* is carried off, which would otherwise incommode the *Cheeks*, as you see it does when any disorder affects these passages, as in the *Ægilops* and *Fistula Lachrymalis*.

While these Papers were Composing at the Press, a Young Gentleman became my Patient, who had labour'd under an *Aposthemation* in this *Antrum Maxillæ Superioris* between 4 and 5 Years: I had seen him about a Twelve-month since, when I told him where the Seat of his Disease was; and the way I would take to Cure him, which

h

he unluckily neglected: And notwithstanding the Arguments used by an Ingenious and Learned Physician, as well as against his own Inclinations, he was at that time prevailed with to defer drawing of his *Tooth*, (which I proposed to him) till Time, with the increase of his Malady, and a late Instance of Success I had in the like case, on a *Person* of the First Rank in *Sence* as well as *Quality*, had confirm'd him of the necessity of doing it : By this time the Matter had of its self made way by the farthest *Dens Molaris* of the left-side, in so much that before the *Tooth* was drawn, I pass'd a Probe by the side of it into the *Antrum*. The Day after the *Tooth* or Stump (for the greatest part of it was mouldred away) was taken out, an ordinary Spoonful, at least, of the worst colour'd and Scented *Pus* flow'd at the Socket, on holding his Head back; I then Syring'd it with a proper Injection, which I continue daily, it now being but three Days since he told me he had very little use for his Handkerchief which he used to change five or six times in a Day for three or four Years before : On visiting him the Seventh Day, when this Sheet came to be Revis'd, he told me, *To his Admiration, He was not only freed of the Flux at his Nose, and violent Pains in his Head, particularly in his Eyes, but restor'd (as he express'd it) to a perfect Tranquility of Health.*

Here

Here I must not omit the Case of an Elderly Gentleman, who had for a longer time labour'd under a Discharge of a great quantity of *Fætid* Matter from his *Nose*; after I had told him how he might be reliev'd, he was by others Laugh'd out of the *Project* (as they call'd it) till at length the *thing* it self convinc'd him of the Truth of what I told him. When he consulted me again, which was several Months after I first saw him; he then sent for a *Tooth-drawer* to take out the *Tooth* I should direct: Tho' the *Operator* attempted it with proper dexterity, not only the *Tooth* which appeared sound, (but was not so) on which he applied his Instrument, but the next *Tooth* also with their *Alveoli* or Sockets came away altogether: this frightened the *Tooth-drawer*, but I shew'd him it was none of his fault, but that the Corrosive Matter which had been so long suffered to lie on the Bone, had Rotted it. In doing this the Patient did not complain of Pain, and was reliev'd of the Discharge at his *Nose*, (the Matter finding a ready passage at the Breach) but was afterwards persu'd with extravagant Pains in his Face and that side of his Head; and at length, after some Months, fell into Convulsive Disorders, and Died.

On opening his Head I found the upper-part of the *Antrum* (between I, e, *. Tab. XVIII.) *Carious*, and part of that Bone mould-

oulder'd away; but the *Caries* did not stop
here, a *Sinus* being made through the
tract of the *Foramen Lacerum*, the op-
posite part of the *Os Sphenoides*, was also
perforated, and the *Dura Mater* laid bare,
and not Perforated, but on the contrary
was inflamed and very much thickened on
that side the Head: I found an *Apothema-*
tion in the *Cortical* substance of the fore-
part of the hinder-Lobe of the *Brain*, of the
same side tho' cover'd with the *Pia Mater*,
in which was about an Ounce of *Fætid*
Matter.

Tab. xv.
B.

T A B.

T A B. XVII.

F I G. I, II, III.

THE Muscles and Cartilages of the *Nose*, all as big as the *Life*.

AA, The *Musculus Elevator Alæ Nasi*, its natural Situation, Fig. I. and hanging down at its Termination, Fig. II.

a, A small fleshy Muscle found in most Subjects, lying under the lower-part of the former, arising from the second Cartilage, and inserted to the first that makes the *Ala Nasi*.

B, The *Musculus Dilatator Alæ Nasi*, a *Elevator Labii Superioris*.

CC, Part of the *Cartilaginous Septum*, between the Cartilages of the *Alæ*.

D, The first proper Bone of the *Nose* bare.

F I G. III.

THE Cartilages of the *Nose* on the left side.

1, The first Cartilage that makes the *Ala Nasi*.

2, The second ty'd to the first, by a Ligament, (*) the superior edge of which cleaves firmly to the Bones of the *Nose*, Fig. II. D.

a, The little Muscle express'd Fig. II. here pin'd out.

b, Part of the *Musculus Elevator Labii Superioris*, fix'd to the Cartilage of the *Ala Nasi*, which part of the Muscle on each side, makes that furrow from the *Septum Narium*, on the middle of the upper Lip.

C, Part of the

C, Part of the *Musculus Dilatator Alae Nasi*, and *Elevator Labii Superioris*.

dd, The Hairs of the Nostrils arising out of the Cartilage of the *Ala*.

FIG. IV.

THE in-side of the right *Foramen* of the *Nose*, as it appears in a Perpendicular Section of the *Skull*, through the middle of the *Os Frontis*, close by the sides of the *Crista Galli*, and *Septum Narium*, with the *Os Palati*, and fore-most *Dens Incisorius* of the left-side, as big as the *Life*.

A, The *Os Frontis* divided which in this Subject, had no Cavity that communicated with the Nostril.

B, The first proper Bone of the *Nose* divided.

C, The Fourth Bone of the upper-Jaw, and *Os Palati*, also divided, with the fore-most *Dens Incisorius*.

D, The *Anterior Appendix* of the *Os Occipitis* also divided.

E, The *Sella Turcica*, fram'd at the conjunction of the *Os Sphenoides* and *Occipitis*.

F, The *Cella Sphenoidalis* open'd.

G, The three or four other Cells of the *Os Sphenoidis*, and *Frontal Bone* by the Orbit of the Eye, which also communicate with the *Foramen Narium*, and are all invested with the *Pituitary Glandulous Membrane*.

H, The *Pituitary Glandulous Membrane* covering the in-side of the *Foramen Narium* and its Cavities; particularly

I, The *Os Turbinatum Superius*, and

K, The

K, The *Os Turbinatum Inferius*, at the extremity of which next the *Fauces*, is.

L, A *Glandulous Body* hanging loose, and very much resembling the *Uvula*. This becoming relax'd whether by *Ulcers*, or *Excoriations*, in the Neighbouring parts, or by *Catarrhs*, occasion that fluttering Noise, which we here in blowing of the *Nose*, and sometimes in ordinary *Respirations*.

a, Part of the *Processus Pterygoides*.

M, A Chink, or Furrow, which passes under the fore-part of the *Os Turbinatum Superius* into which opens one of the Perforations from the *Antrum Maxilla Superioris*, express'd Tab. XVIII. Fig. I. L. in the lower-part of which Chink in this Subject, was the Aperture to that *Antrum*, express'd Fig. VI. By a Probe passing through it. B.

FIG. V.

THE inside of the *Os Turbinatum Superius* express'd at I, Fig. IV. cover'd with its *Glandulous Membrane*.

A, A Cavity or Depressure of this Bone opposite to the *Foramen* express'd at A, Fig. VI.

B, The upper-part of the *Os Turbinatum* which adher'd to the sides of the *Cells G*, Fig. IV.

FIG. VI.

THE Two Apertures from the *Antrum Maxilla Superioris* into the *Foramen Narium*, of the right-side, as they appear when the *Os Turbinatum Superius* (mark'd I, Fig. IV.) is remov'd.

A, The

Fig. I.



Fig. III.



Fig. II.

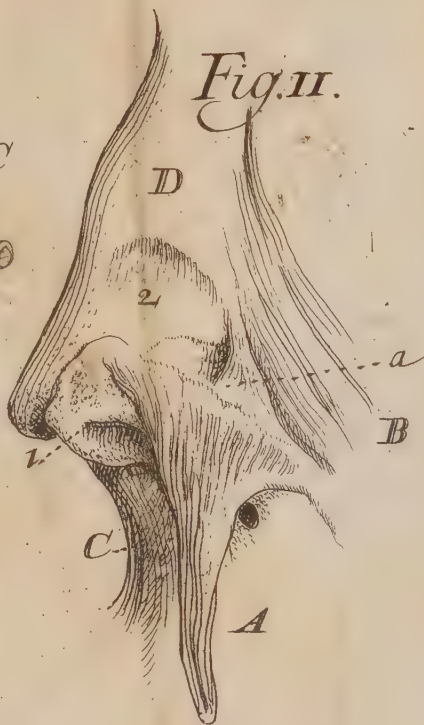


Fig. IV.



Fig. VI.

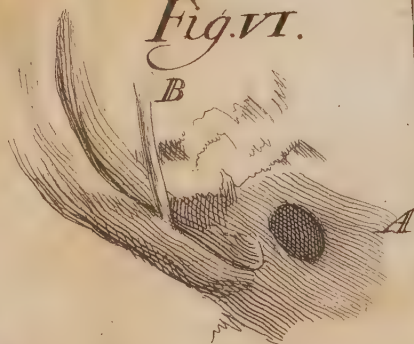
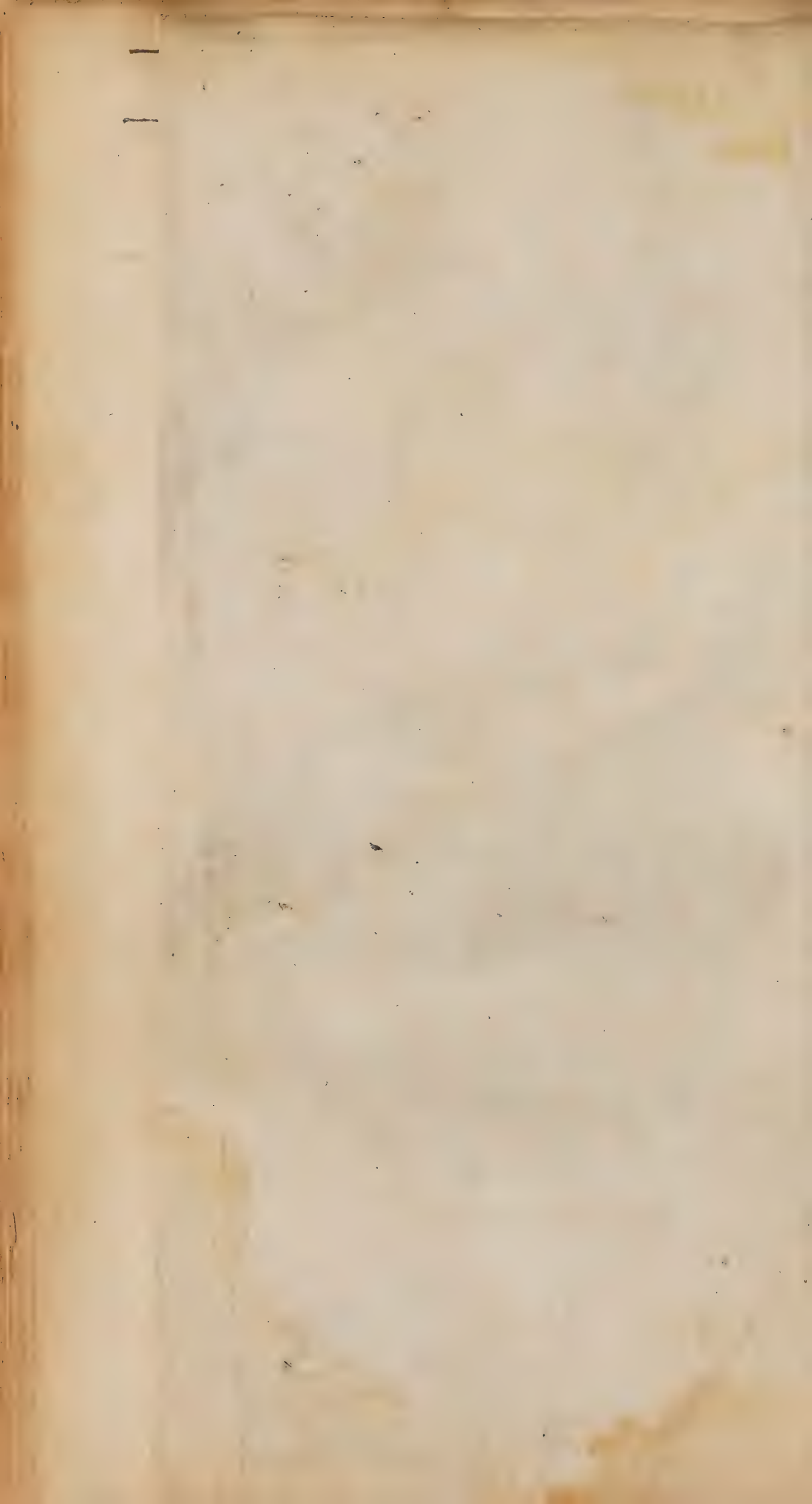


Fig. V.





A, The *Posterior*, or largest Perforation
that opens against the Cavity, or Cell of the
Turbinatum, Fig. V. A.

B, The end of a *Probe* passing out of the
ore-most and lesser Perforation in the Chink,
M, Fig. IV.

N a

T A B.

T A B. XVIII.

F I G. I.

THE right-side of the *Skull* with *Basis* turn'd somewhat upward, the latter to shew the *Antrum Maxilla Superioris* which is here open'd after sawing off lower-part of the *Cheek Bone*, as big as *Life*.

A, The *Os Frontis*.

B, The *Bregma*.

C, The *Occipital Bone*.

D, That part of the *Os Temporum*, called *Os Squammosum*.

E, That part of the *Os Sphænoides*, that touch'd by the *Os Frontis*, *Bregma* and *Squamous* part of the *Temple-Bone*.

aa, The *Sutura Coronalis*.

bb, The *Lambdoides*.

cc, The *Squamosa*.

F, The *Cheek-Bone* reckon'd the first of the *upper-Jaw*.

** Its lower-side saw'd off in order to shew the *Antrum Maxilla Superioris*.

G, The second Bone of the *upper-Jaw* called *Os Lachrymale*, *Os Unguis*, &c.

H, The First proper Bone of the *Nose*.

III, The Fourth Bone of the *upper-Jaw*, which is,

K, The *Antrum Maxilla Superioris*, whose external Surface is here remov'd to shew the *Glandulous Membrane*, that lines its inside, in which its numerous *Blood-Vessels* appear: And,

L, T

L, Two *Foramina* in its upper-part, which open into the *Foramen Narium* of that side, as express'd in the preceding Table, Fig. VI. A B.

M, The thickness of the sides of the *Antrum*, above the Roots of the second *Dens Molaris*.

N, Part of the *Os Palatum*.

OO, The *Processus Pterygoides*.

PP, The *Processus Styloides*.

QQ, The *Processus Mastoides*.

R, The external Surface of one of the Processes of the *Occipital-Bone*, which is Articulated with the first *Vertebra* of the Neck, on the right side.

S, The hole in the *Occipital-Bone* by which the *Medulla Oblongata* passes out of the Skull.

T, The internal aspect of the left *Occipital-Process*, that is received in a corresponding depression of the first *Vertebra* of the Neck, the Perforation here express'd serves for the Transmission of one of the *Ninth Pair* of Nerves.

VX, A Prominence and rising Seam in the *Occipital-Bone* at the termination of the Muscles of the Head, to which the *Ligamentum Colli* is fix'd at V, This in some Skulls is much larger than here express'd; in others you will find no Prominence in this part of the Bone.

Y, The *Anterior Appendix* of the *Os Occipitis*, to which the *Musculi Annuentes* and *Flexores Capitis*, are inserted.

d, The *Meatus Auditorius*.

e, The *Os Jugale*, composed by a Process of the *Os Temporale* and first Bone of the upper-Jaw.

f, A shallow depression of the *Os Temporum*, in which a movable Cartilage is placed for the Articulation of the lower-Jaw.

ggg, The *Suture* of the *Os Temporum* with the *Os Sphænoïdes*.

h, A Perforation by which a Branch of the Fifth Pair of Nerves passes the Basis of the Skull reckon'd the Third Perforation of the *Os Sphænoïdes*.

iii, The *Ala* or Wings of the *Os Sphænoïdes* call'd *Pterygoides*; from the external Surface which (here express'd on the right-side) the *Musculus Pterygoideus Externus* does arise; does the *Musculus Pterygoideus Internus* from the Internal Surface of this Process here seen on the left-side i.

FIG. II.

A Side view of part of the Bones of the upper-Jaw and Nose after the lower-part of the Cheek-Bone was saw'd off to discover the *Antrum Maxilla Superioris*; the Cartilages of the Nose express'd Fig. III. in the preceding Table, being remov'd to shew the *Septum Nasarium*: Drawn from a Diseas'd Body that Died Emaciated.

A, The *Os Frontis* bared.

B, The Cheek-Bone or first Bone of the upper Jaw.

C, The Cartilaginous part of the *Septum Nasarium*, cover'd with its Glandulous Membrane, full of Blood-Vessels.

D, A *Cystis* or Glandulous Bag distend'd with Mucous Matter, which fill'd the *Antrum*.

aa, A Branch of an Artery fill'd with Wax passing to the Fore-head.

b, The *Trochlea*, or little hollow Cartilage

thi

Fig. II.

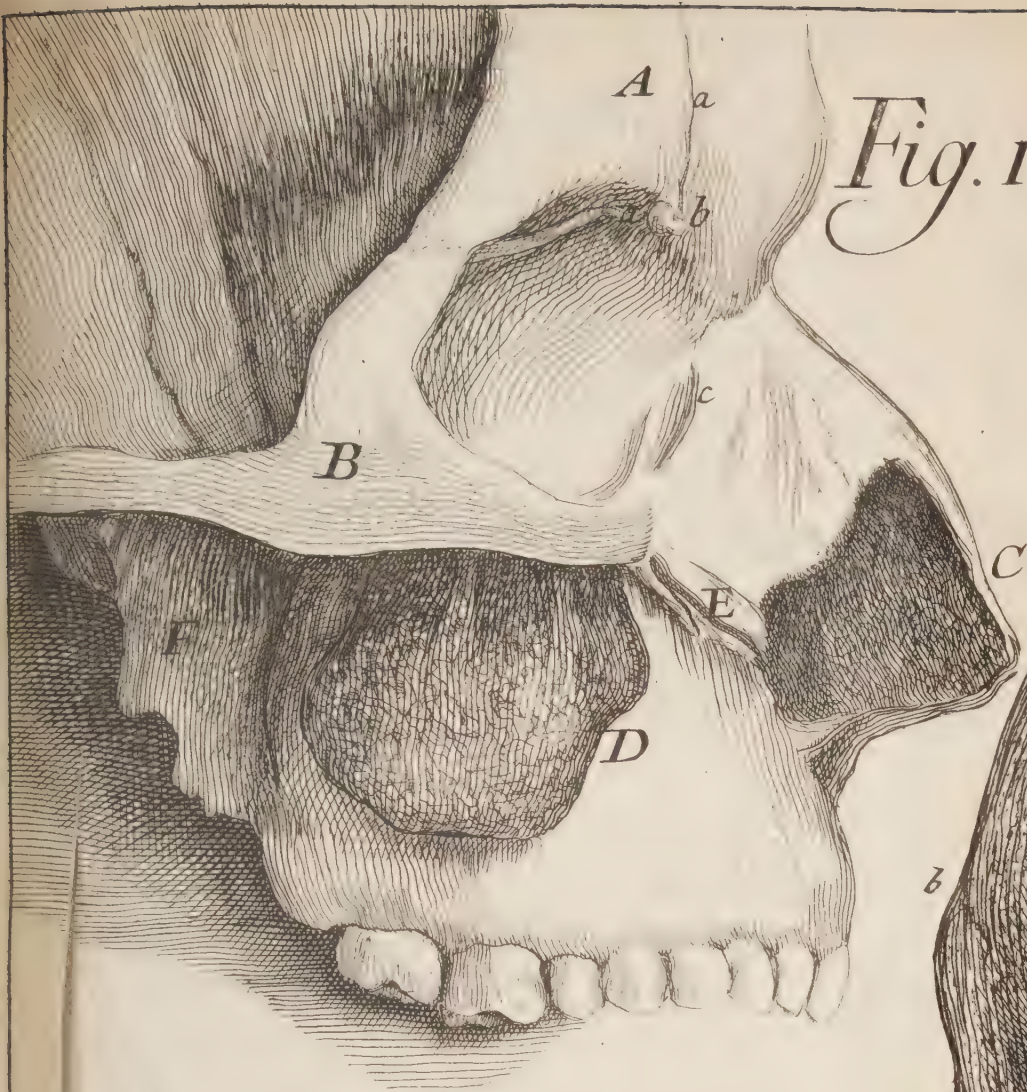


Fig. I.

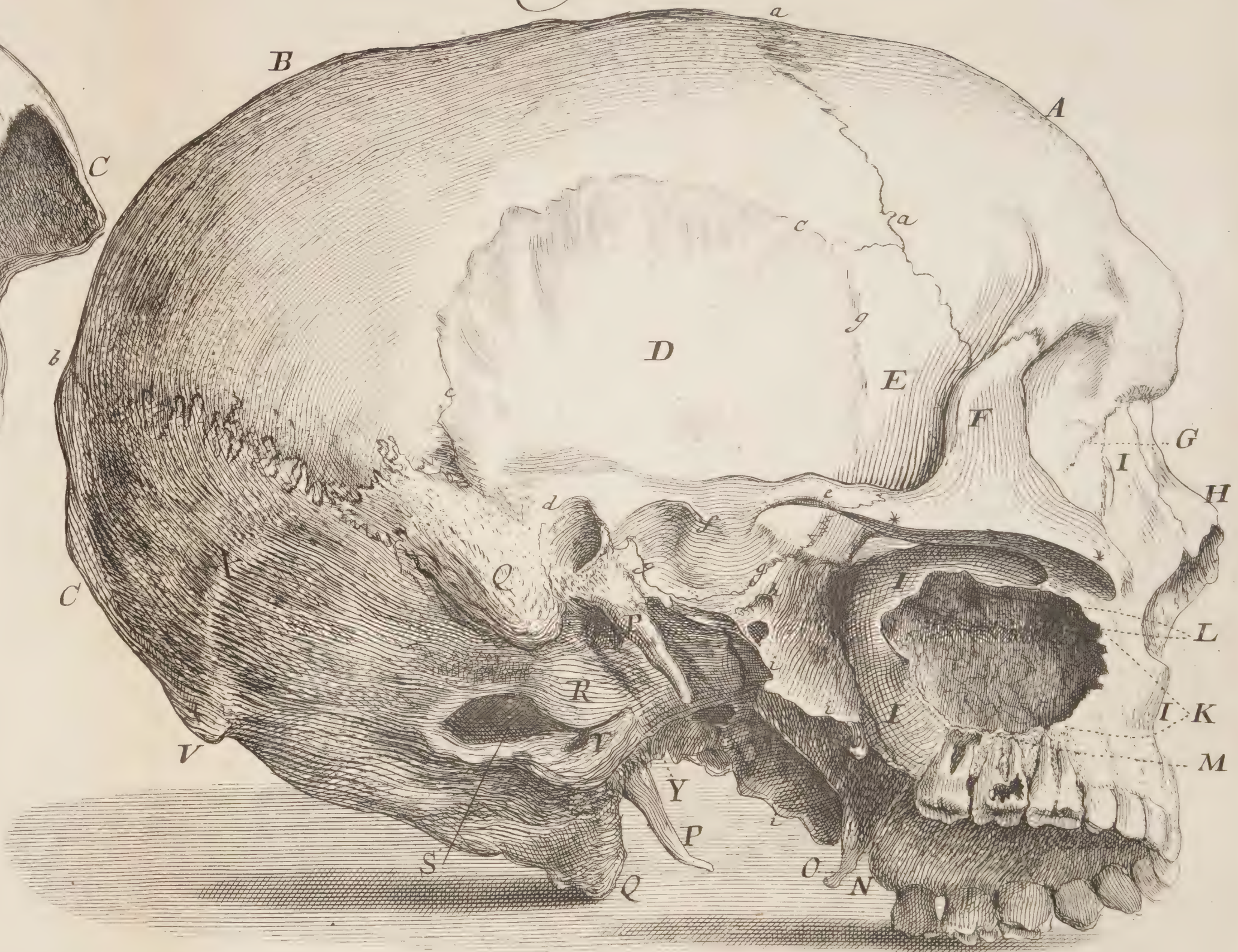
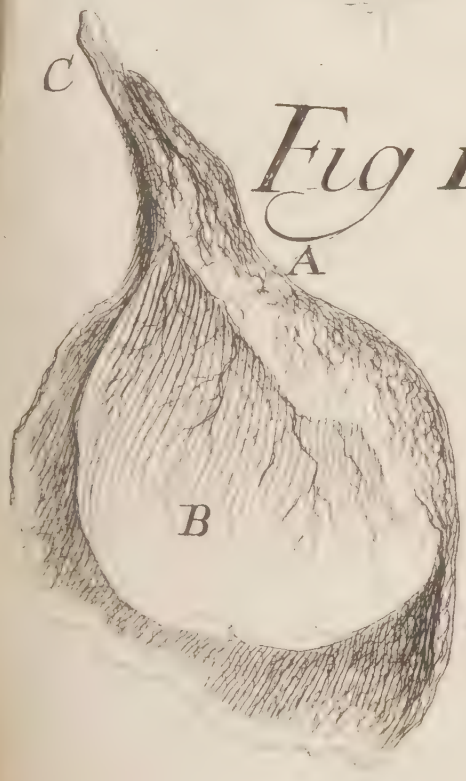
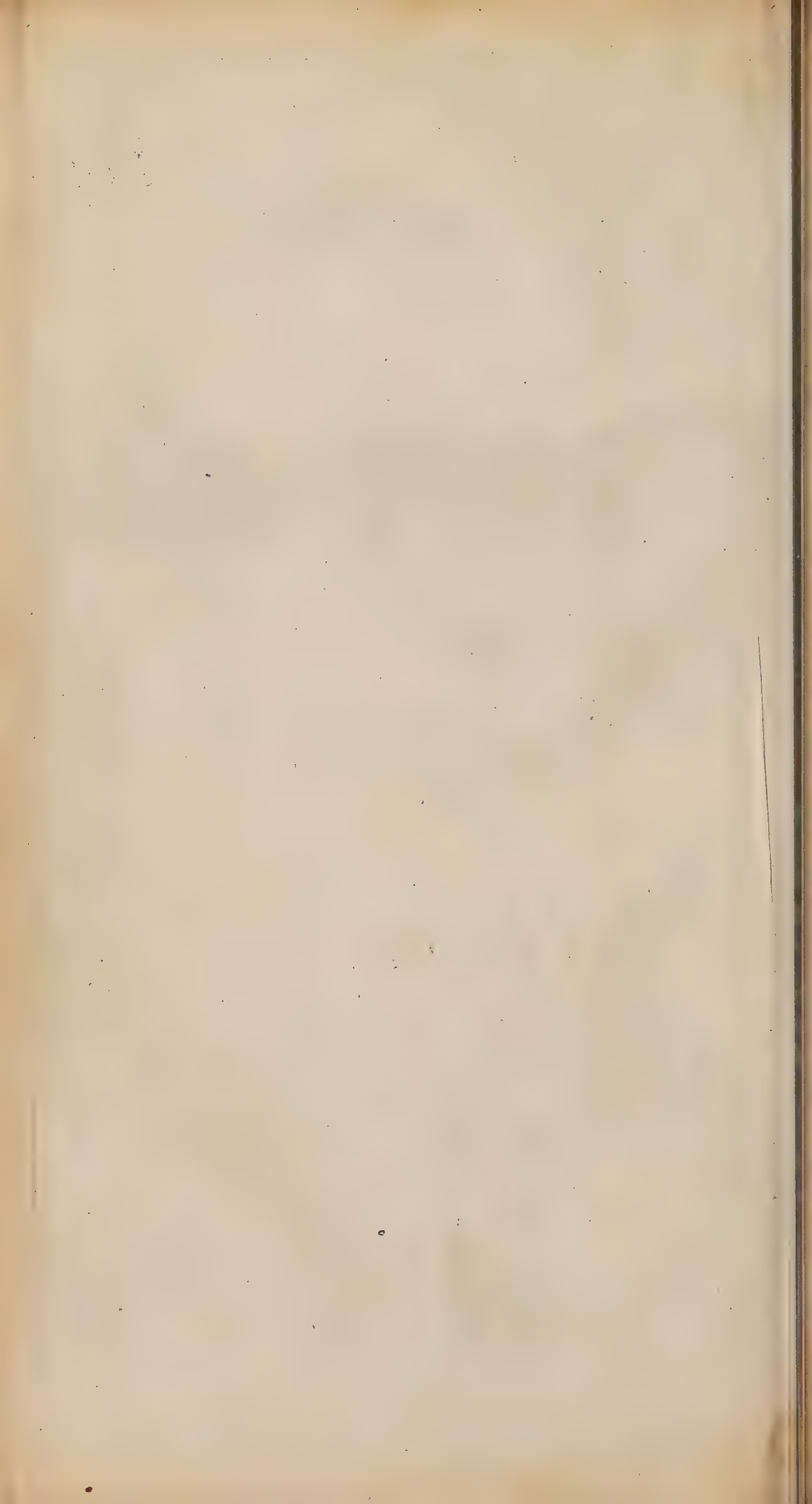


Fig. III





thro' which the Tendon of the *Musculus Obliquus Superior Oculi* passes.

C, The *Foramen* compos'd by the Second and Fourth-Bone of the upper-Jaw, by which the superfluous Moisture of the Eye is convey'd to the *Foramen* of the Nostril.

E, The Branch of an *Artery* with one of the Fifth Pair of *Nerves*, passing out at a Perforation in the Fourth-Bone of the upper-Jaw.

F, The *Ala* of the *Os Sphenoides*.

F I G. III.

THE *Cystis*, express'd at D in the preceding Figure, taken out, fill'd with the *Mucous Humour*.

A, Its external *Glandulous Membrane* full of *Blood-Vessels*.

B, Its middle *Membrane* with fewer *Blood-Vessels*, besides which it had an internal *Transparent Membrane*, like the *Tunica Allantoides*, in which the *Mucous Humour* was contained.

C, Its *Root* or *Pedunculus*, by which it grew to the upper-part of the *Antrum*.

After this *Cystis* was remov'd, it was remarkable that the Cavity of the *Antrum Maxillæ Superioris* had still a *Membrane*, tho' thinner than is Natural, that invested it.

N. B. Had these *Antra* of the Upper-Jaw been oftner looked into, I am apt to think they would have been found the Seats of other Disorders, perhaps of the Catarrh, and particularly the *Catarrhus Suffocatorius* of the Ancients, which they thought proceeded from the Brain.

C H A P. XI.

Of the EYES.

S Y L L A B U S

Partium Maxime Spectabilium Circa

Oculum	Supercilia	{ Attollens
	Palpebræ	{ Orbicularis
	Cilia	
	Cartilagine	
	Musculi	{ Attollens
		{ Deprimens
		{ Adducens
		{ Trochlearis
		{ Obliquus Inferior
		{ Abducens
	Cantbi	{ Major
		{ Minor
	Glandulæ	{ Lachrymalis
		{ Innominata
	Puncta Lachrymalia	
	Tunicæ	{ Adnata
		{ Sclerotica
		{ Cornea
		{ Choroides
		{ Uvea
		{ Retina
	Iris	
	Pupilla	
	Ligamentum Ciliare	
	Humores	{ Aqueus
		{ ChrySTALLINUS
		{ Vitreus
	Vasa	{ Nervi
		{ Arteriæ
		{ Venæ
		{ Ductus Lymphatici Nuckiani

Supercilium.

JUST above the ORBIT or hollow in which the Eye is receiv'd, external appears the Eye-brow in form of a Segme

of an *Ellipsis* cover'd with *Hair*, which springs from some *Glands* and *Fat* placed betwixt the *Skin* and *Panniculus Carnosus* upon the upper-edge of the Bone, and is contriv'd by Nature to Arrest the Course of *Sweat*, and keep it from falling into the *Eye*.

From hence is immediately continu'd a *Palpebræ Muscular Membrane*, which with the *Skin* makes the upper-*Eye-lid*, and is answer'd on the lower-part by another of the like Figure and Structure, which together serve to cover and defend the *Eye* in the time of Sleep, and upon other occasions.

Both *upper* and *under-Eye-lid* are fring'd *Cilia*. with *Hair*, especially the *upper*, which is larger and stiffer than that of the *under*, and seems to be a contrivance to break the too fierce impressi^{on} of the Rays of Light, as likewise to keep out *Flies* and *Moates*, and other things that float in the Air which annoy the *Eye*.

These *Hairs* spring from a small row of *Glands*, which cover a thin, tender, *Cartilage* which edges each *Eye-lid*, and serves as a kind of a Ring to stretch them upon.

These *Eye-lids* are both movable, especially the *upper*, which has two *Muscles* to raise and depress it, which are call'd *Attollens* and *Deprimens*. The first of which arises from the Bottom of the *Orbit* of the the *Eye*, near the entrance of the *Optick*

Nerve, where it is *Tendinous*, soon growing fleshy afterwards, and with a broad thin *Tendon* terminating in the *upper-Eye-lid*.

Depri-
mens.

or,
Orbicu-
laris.

Tab. xxiii
2.

The *Deprimment* springs from each corner of the *Eye*, and is answer'd by another circular like Figure and Structure in the lower *Eye-lid*, which are therefore often consider'd together by Anatomists as one *Orbicular Muscle*. It is a fleshy Muscle whose Fibres environ the *Eye-lids*, and are inserted into them not unlike the *Sphincters* of other parts. It is fastned to that part of the Margin of the *Orbit* towards the *Nose*, which is made by the *Fourth Bone* of the *upper-Jaw*.

Besides these Muscles, the *Eye-lids* are mov'd secondarily by others. The *upper* being retracted by the Muscles of the *Fore-head*, and the *lower* by those that move the *Lip* and *under-Jaw*.

Verhey-
en's Mus-
cle.

Verheyen has observ'd a small Muscle which arises from the *First Bone* of the *upper-Jaw*, and terminates in the *Carnous* or *Musculous* part of the *lower-Eye-lid*.

Mem-
branes.

The in-side of the *Eye-lid* is lin'd with a thin, fine, smooth *Membrane* from the *Pericranium*, and the out-side is protected by the common coverings of the rest of the *Face*, the *Cuticle* and *Skin*.

Canthi.

App. Tab
xvii. Fig.
1.

At the commissure or joining of the *Eye-lids*, are form'd two *Angles* or *Corners*, of which the inner (that next the *Nose*) is call'd *Canthus Major*, the other *Minor*; In the

the former of which lies a small *Gland* of an oblong Figure, which is call'd *Glandula* or *Caruncula Lachrymalis*, tho' perhaps improperly. From this *Gland* proceed two or three small *Ducts*, which opening upon the inner Surface of the *Eye-lid* serve to moisten the *Globe* of the *Eye*, and keep its Membranes from growing too dry. In this corner of the *Eye* are two small Perforations, which are call'd *Puncta Lachrymalia*, which open and discharge the superfluous Moisture of the *Eyes* into the *Nose*, through a large Excretory Tube.

Glandula Lachrymalis.
App. Tab xvii. Fig. 5.

Puncta Lachrymalia.
ib. Fig. 6.

On the upper-part of the Ball of the *Eye* near the lesser or external *Canthus*, lies a large *Gland* call'd *Innominata*, which consists of several small Lobes: Each of which sends out a *Duct*, by some Branches of which the *Eye* is irrigated, and the overplus of the Humour carried to the greater *Canthus*, and transmitted to the *Nose* thro' the *Puncta Lachrymalia*. From these *Glands* proceeds that Humour which forms the *Tears*.

Glandula Innominata.
ib. Fig. 2.

The *Eye* is of a *Globular* Figure, and consists of *Membranes*, *Vessels*, and *Humours*. It is cloath'd in some parts with *Fat*, and mov'd by *Muscles*, which two latter, are by most *Anatomists* numbred among the constituent Parts, tho' improperly.

Parts of the Eye.

To the *Eye* belong six *Muscles*, by means of which it enjoys various Motions; of these,

Muscles.

App. Tab
xvii. Fig.
4.

Attollens
Humilis.

Addu-
cens.
Abdu-
cens.

Obliqui
seu
Rotato-
res.

Tab. xviii
Fig. ii. 6.

Troch-
learis.

these, four are from their Situation ar-
call'd *Recti*, or *streight Muscles*, coming
from several points of the bottom of the
Orbit, and running immediately over the
first proper *Tunic* of the *Eye*, between tha
and the *Adnata*. These *Muscles* have from
their several Offices several Names, on
being call'd *Attollens*, because it draws the
Eye upwards; another *Deprimens* from pul-
ling it downwards, the third *Adducens*
which draws the *Eyes* towards the inward
Canthus: and the fourth *Abducens*, from
its forcing towards the outward *Canthus*.

Besides these, there are two other *Mus-*
cles, which are called the *Oblique*, of which
the *upper* spring from the same Origine
with the *Adducens*; from whence tending
upwards towards the inward *Canthus* of
the *Eye*, it passes through a Cartilage on
the Bone of the *Fore-head*, which is call'd
Trochlea, and the *Muscle* it self *Trochlearis*.
From this *Trochlea* it is reflected to its Ter-
mination in the *Tunica Sclerotis*, directly
between the Termination of the *Attollens*
and the *Optick Nerve*, which is on the back
part of the Ball of the *Eye*. When this *Mus-*
cle acts, that part of the Ball of the *Eye*
drawn towards the *Trochlea*, whereby the
Pupil is directed downwards towards the
lesser *Canthus*, and at the same time the
whole Ball of the *Eye* drawn somewhat out-
wards.

The

The *lower Oblique Muscle* rises from the external Margin of the *lower-part* of the *Orbit* near the inward *Canthus*, and from thence running towards the outward *Canthus* terminates near the other, behind the Termination of the *Abducens*. This draws the Ball of the *Eye* outwards, and turns its *Pupil* upward, contrary to the former.

Obliquus
Inferior.

Between these *Muscles* lies the *Fat* interspers'd, which serves to lubricate and facilitate their Motion.

Fat.

Over all these *Muscles* is spread a pretty thick white *Membrane*, which is call'd *Tunica Adnata* or *Conjunctiva*, and makes that which is commonly call'd the *White* of the *Eye*.

Tunica
Adnata.
App.Tab.
xvii. Fig.
4. H. H.

This *Membrane* covers the whole Ball of the *Eye*, except the fore-part which is call'd the *Sight*. This is not number'd among the *proper Tunics* of the *Eye*. It is extremely sensible, and abounds with Veins and Arteries, which are very visible in *Opthalmies* or *Inflammations* of the *Eyes*.

There are three other *Membranes* proper to the *Eye*, of which some *Anatomists* make five. The first of these is a pretty tough *Membrane* deriv'd from the *Dura Mater*, which passes to the *Eye* from the *Brain* along with the *Optick Nerve*, and is from thence propagated over the whole *Globe* of the *Eye*, and is on the fore-part, which covers the *Sight* transparent, which has given *Anatomists* occasion to make two

Three
proper.

Sclerotica.
Ib. Fig.
10.

Mem-

Membranes of it, and to call the transparent part *Cornea*.

The second is deriv'd from the *Pia Mater*, and transmitted likewise from the *Brain* along with the *Optick Nerve*. This is much thinner and tenderer than the former, and ting'd on the hinder-part, with a black Liquor separated from the *Blood-Vessels*, with which it abounds. The fore-part of this is as the former, transparent, but thinner, and is by Authors reckon'd as another *Tunic*, and call'd *Uvea*.

Of the Duplication of this Part of this Membrane, is form'd that striped variegated Circle which is call'd the *Iris*, which is in several Subjects of different Colours. In its middle is a Perforation, thro' which appears that little black Speck which is the *Sight*, or *Pupil* of the *Eye*, about which the *Iris* forms a Ring. From the in-side of this Membrane spring certain Fibres, which spread themselves round the *Chrystalline Humour*, and serve to contract or dilate the *Sight* as occasion requires, and are call'd *Ligamentum Ciliare*. From the blackness of the hinder-part of the *Tunica Choroides* the transparent Humours of the *Eye* derive that seeming blackness, which appears in them.

The *third Tunic*, which some reckon the *sixth* (numbring the *Adnata* among them) is the *Retina*, which is only a kind of

of *Net-work* expansion of the Medullary substance of the *Optick Nerve*, and is spread only on the bottom of the *Eye*, opposite to the *Sight*, and is the proper Organ of *Vision*.

Between these Coats are contain'd three *Humours* of the Eye. The first of which is call'd the *Aqueous*, because in its consistence and colour it somewhat resembles Water, being almost equally limpid and transparent. This *Humour* lies immediately under the *Cornea*, which it causes to protuberate a little. The Learn'd Dr. *Nuck* (that inquisitive *Anatomist*) pretends to have discover'd some *Ducts*, which convey this *Humour* to the in-side of this Membrane, which discovery has however been contested. The Author is notwithstanding so Ingenuous as to own, that by whatever Inquiries or Experiments he cou'd make (in which he was usually very happy) he cou'd never trace these *Ducts* to their Source. Some (who will not allow these *Ducts*) would have this *Humour* to be deliver'd immediately from the *Arteries*, because they cannot find from whence it should come, which is an Opinion contrary to the Method of Nature in other separations. But if a conjecture may be allow'd in this case, believing *Nuck's* discovery to be real, it is not improbable that these *Aqueous Ducts* are only Branches of the *Excretory Ducts* of the *Glandula Innomi-*

Humours
of the Eye

Aqueous.

Ductus
Aquosi.
Nuckii.

nominata and *Lachrymalis*, which piercing the *Tunics* of the *Eye*, deliver their Liquor by ways hitherto undiscover'd. This only is certain, that they must have some considerable Source; because, if by any accident the *Tunic* of the *Eye* be wounded, and the Humour runs out, as it readily will, by meer closing of the *Eye*, the Wound is soon heal'd, and the Humour recruited, which cannot naturally be expected from the *Arteries*, without some intermediate Organ of Separation: which Organ has not yet been elsewhere discover'd.

Chrystallinus.
App.Tab
xviii.
Fig. 1, 2,
3.

The *Chrystalline* Humour, improperly so call'd (because it is not *Fluid*) is in Mass of a flattish Convex on both sides, approaching to a Circular Figure, but a little more Convex on the hinder than the fore-part.

Vitreus.

Next under this lies the *Vitreous Humour* so call'd from the suppos'd resemblance of melted *Glass*. The fore-part of this Humour is Concave, occasion'd by the impression of the *Chrystalline* upon it. On the hinder-part almost of a Spherical Convexity.

Some *Authors* finding these *Humours* cover'd by *Membranes*, have given distinct Names to them, and so increas'd the number of Coats to Nine. But these being only Productions of those already mention'd it is not necessary to perplex the Reader with needless distinctions.

Behind

Behind all these Coats and Humours, ^{Optick Nerve.} thro' a Perforation of the *Skull*, in the hinder-part of the *Orbit*, the *Optick Nerve* enters the *Eye*, which has been already described: as have likewise the other *Nerves*, serving for the Motion of the *Eye*.

It receives *Arteries* both from the Inter-^{Arteries,}nal and External *Carotis*, and returns the ^{Veins.} *Blood* by *Veins*, that go to the *Jugulars*.

C H A P. XII.

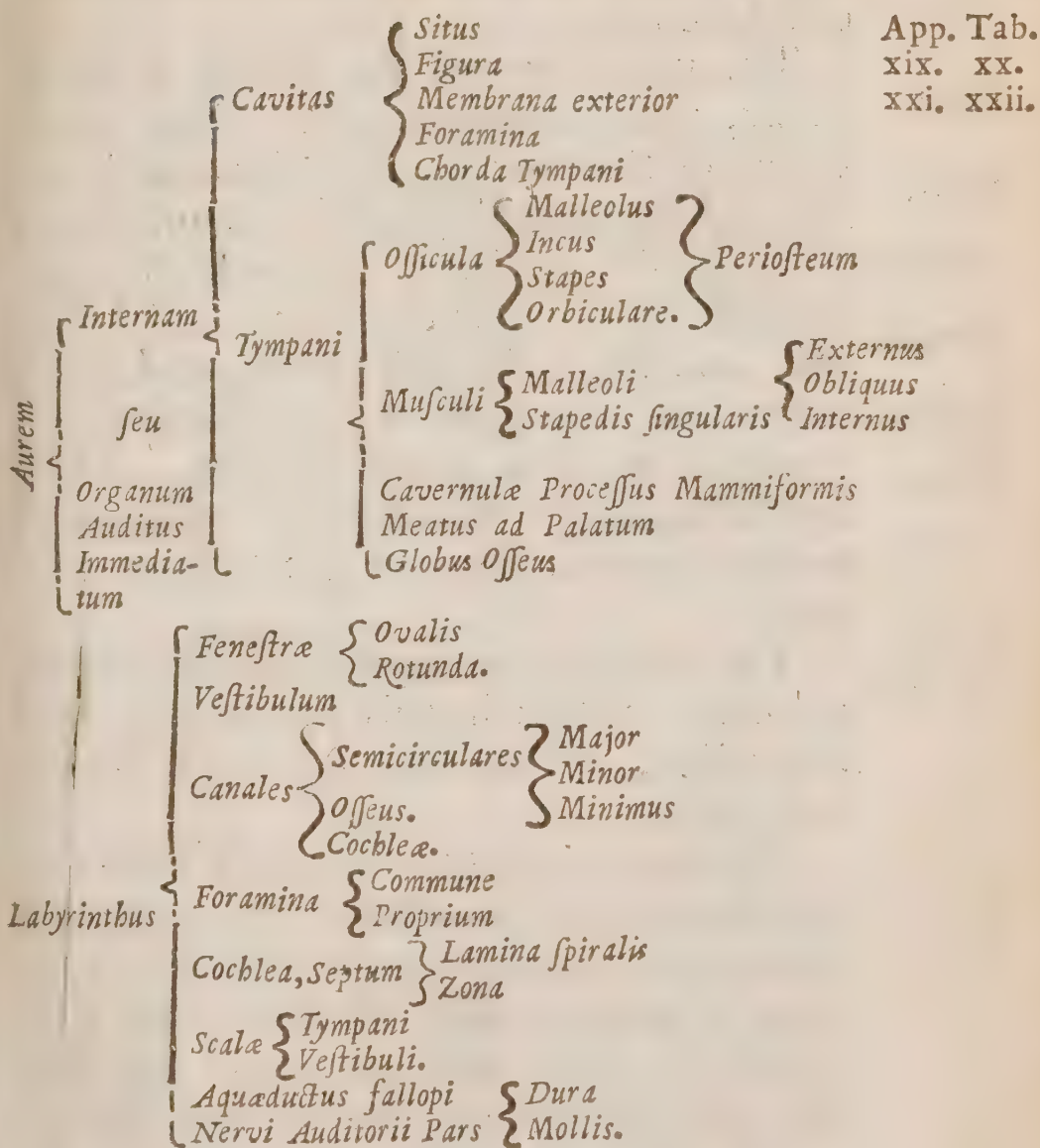
Of the E A R.

S Y L L A B U S.

Eorum quæ Conspiciantur circa

Aurem	Exter- nam.	Cuticula
		Cutis
		Cartilago
		Adeps
		Helix
		Anthelix
		Tragus
		Antitragus
		Concha
		Scapha
	seu	Musculi { Attollens
		{ Retrahens
	Auricu- lam.	Vasa { Arteriæ
		{ Vena
		{ Nervi
		Ligamentum
		Alvearium
		Meatus Auditorius
		Pili
		Glandula { Parotides
		{ Ceruminosæ
		Corpus Reticulare
		Areola
		Membrana Tympani ————— inter utramq;

Aurem



THE EAR is generally divided into *Auricula*
External and *Internal*. The *first* of *Auris.*
 which, comprehending all that is promi-
 nent from the Head, and the Cavity on the
 inside of it, is call'd the *Auricle*. The in-
 ner

Tab. xix. *ner* part, which enters the Skull by a narrow Passage, is in a restrain'd Sense alone call'd the *Ear*.
Fig. 1.

The upper part of the *Auricle* is call'd
Pinna. *Pinna*, and sometimes *Ala*. The whole
Helix. extent of the *Auricle* outwards is call'd *Helix*, and the inward Protuberance answering
Anthelix. to it is call'd *Anthelix*. The little Protuberance of the side next the Face is call'd *Tragus*,
Tragus. and the Ridge just above, and opposite to it is *Antitragus*, and the Hollow surrounded by these is call'd *Concha*. These
Antitragus. are Particularities which some Authors have
Concha. been very exact in to no great use or purpose.

The *Auricle* is compos'd of the *Cuticle*,
Constitu- the *Skin*, (which in this part is very thin)
ent Parts. a *Cartilage*, a little *Fat*, a pair of *Muscles* and *Vessels*.

The *Cuticula* has no difference from that of other parts; in a *Fœtus* it is continu'd within the *Meatus* over the *Membrana Tympani*, whence it falls off some time after the Birth; if it remains, it not only hinders the Excretion of the *Ear-wax*, but occasions *Deafness*, till its remov'd: An Instance of which I saw in a Girl about eight Years old, who was said to be Born Deaf, but recover'd her Hearing on the coming away of this Membrane: Its use is in the *Fœtus* to defend the *Membrana Tympani* from the Contents of the *Amnios*.

The

The *Cartilage* is the *Basis* and support of the whole, and tho' it be furnish'd with two pair of Muscles, yet these are in Men so small, that the *Auricles* are seldom moveable; and that in some of those only who move the whole Scalp. The superior of these is from its Position, rather than manifest Action, call'd *Attollens*, which in truth is no other than a part of the Muscle of the Scalp (of which hereafter) with some fleshy Fibres in it, as it descends over the *Temporal* Muscles to the upper part of the *Concha*. Besides this, Dissection discovers another parcel of fleshy Fibres, which in some Bodies are divided into three distinct Muscles, arising from the *Os Temporale* above its *Mamillary* process, and are fix'd to the hinder part of the *Concha*. To these a late Author, *Valsalva*, adds another new Muscle, as he affects to call it, springing from the fore-part of the Membrane of the *Temporal* Muscle, and inserted to the Fore and upper part of the *Ear*. But this, and two other Muscles, which he calls *Musculus Tragi*, and *Musculus Antitrangi*, seem to be more the effect of Fancy, than any real Existence in Nature. He tells us of a new *Ligament* of the *Auricle*, that ties the *Cartilaginous* part of the *Meatus* to the *Temple Bone*, near the rise of the *Processus Zygomaticus*. The Blood is sent to these parts by Branches of the *Carotids*,

Muscles.
Tab. xix.
Fig. 1.

Attollens.

Retra-
hens.

Ligament

tids, and is reconvey'd by the external *Jugulars*.

Nerves.

The Nerves are of two sorts, the *first* is from the *hard Portion* of the *Auditory Nerve*, marching out by that Perforation in the Skull, call'd *Aquæductus Falloppii*, bestows Branches on the fore-part of the *Auricle*, and its *Meatus*, before it is spread into the parts of the Face. The second springs from between the first and second *Vertebra* of the Neck; whence descending, it sends a Branch to the Muscles of the Neck, and another to the *lower Jaw*, and *Parotid Gland*; but its main Trunk ascending again, bestows Branches on the *back Part* of the *Auricle*, before it passes to the top of the Scalp: This Branch of it goes to the *Auricle*, and is burnt for the Tooth-ach, *vid. Tab. xix. Fig. 1. H.*

Use of the Auricle.

The use of the *Auricle* is to collect Sounds. But whether those Men that have the Faculty of *pricking up their Ears*, are quicker of Hearing than other Men, I can't determine, tho' it seems probable, that they shou'd; and it is observable, That all who have that Faculty, have large *Auricles*.

Parotides

Behind, and about the *Auricles* under the Skin are situated divers Glands, which from their place are call'd *Parotides*. Two of which being more considerable than the rest, for their Magnitude are generally

un-

understood by that Name. These are *Conglomerate*, and by divers excretory Vessels, which at last coalesce into one Trunk, discharge their Liquor into the *Mouth* at the inside of the Cheek, by the second grinding Tooth. Near these are two other *Conglobate* Glands, which being less, are in a manner obscur'd by them.

The bottom of the *Concha*, or hollow *Auris* of the *Auricle*, which is call'd by some *Alvearium*, terminates at the *Meatus Auditorius*, which is the entrance of the *Auris* or *Ear*, strictly so call'd.

The exterior Part of this *Meatus* is *Cartilaginous*, tho' not so in all parts, especially the upper. This *Cartilage* is irregularly divided with fleshy *Membranous* Interpositions in several parts of it, not unlike the *Bronchia* in the Lungs, only its fleshy Fibres are here thicker. The inner Part, or that which is nearest the *Brain* is Bony. It is lin'd throughout with a thin Membrane, deriv'd from the Skin, which is continu'd on the *Membrana Tympani*, where it becomes thinner: From the beginning of the *Meatus*, near half way, arise a great number of small Hairs, at whose Roots issues the *Ear-Wax*, which is intangl'd in those Hairs, the better to infringe the *Impetus* of the external Air, and prevent its too suddenly rushing in on the *Membrana Tympani*. Under this is a reticular Body,

Alvearium.

Meatus Auditorius.

Pili.

Glandulæ Ceruminosæ. in whose *Area* are plac'd the Glands, that separate the *Ear-Wax*.

Tab. xix. Fig. 1. R. These Glands are round, and somewhat flattish, and of oval Figures, and have a brighter yellow Colour than the Wax they separate: Their excretory Ducts discharge themselves at the Roots of the Hairs abovemention'd.

Cerumen. The use of the *Cerumen*, or Ear-Wax, *Its Use.* is not only to defend the *Meatus*, and *Membrana Tympani* from external Injuries, whether from the outward Air, or other extraneous Bodies; but it prevents any violent *Impetus* in Sounds on the *Membrana Tympani*, as above noted.

The Course of this *Meatus* is winding turning sometimes upwards, sometime downwards, but always bending toward the Face.

Tympanum, or Membrana Tympani. This Passage is clos'd inwardly by a thin transparent dry Membrane, stretch'd upon a Bony Circle, and is call'd *Membrana Tympani*, and improperly *Tympanum*.

The Organ of Hearing. This is the immediate Organ of Hearing, and if by any Accident it happens to be broken, Hearing is utterly destroy'd: by too much Moisture, whether from the Glands, or from Impostemation, or other Chance whatsoever, it is relax'd, the Hearing is vitiated, and becomes defective: And on the other hand, when it is too Tense (as sometimes in Fevers, and Inflammatio

of the *Ear* it happens to be) that Sense becomes acute, even to a Grievance.

This Membrane divides the *External Tympani-* from the *Internal Auris*.

The situation of this Membrane, with *Situs Fi-* respect to the erect Posture of the Body, *gura.* is oblique, facing downwards, whence it is *Tab. xix.* we better hear Sounds that come from be- *Fig. 1. T.* low, than those from above: Its external Surface is a little hollow'd in its Middle, by the Handle of the *Malleus*, and consequently its Internal next the Cavity of the *Tympanum* is Convex in its Center. Its said to be compos'd of two Membranes, which perhaps may be no more than the condition of all other Membranes, *i. e.* consisting of divers *Lamellæ*, that may be divided into two, three or more, as the Part happens to be charg'd with any extravasated Humour. However its pretended, that one of these Membranes is continu'd from the *Dura Mater*, that passes thro' the *Commis-* sure, between the *Os Temporale* and *Petro-* sum.

The *Membrana Tympani* has a Perforation that admits of the Passage of Wind, and in some Smoke from the *Meatus*, a *Palato* to the *Tympanum*; This Passage is very small, and runs obliquely from the *Tympanum*, through its Membrane in its upper part, near the Process of the *Malleus*: The existence

Foramen
Membrana.

Tab. xix. of this Perforation is more evident by the egress of Wind, (when Ulcers affect the *Meatus* by the Patient's stopping his Nose and Mouth, and forcing the Wind by the Ears and in Smokes coming that way) than by any Anatomical Inspection. But in some Subjects it has been seen by blowing into the *Meatus a Palato*.

Veins.

The *Membrana Tympani* has Arteries from the *Carotides* and *Veins*, which empty themselves into the *Diverticulum* of the *Internal Jugular*. It has a remarkable Branch of a Nerve that passes on its internal Surface between the *Incus* and *Malleus*, which is call'd *CHORDA TYMPANI*, of the distribution of this Nerve, (which is a Branch of the hard Portion of the *Auditory Nerve*) we shall speak in the particular Place.

Chorda Tympani

Meatus Internus.

Behind this is a *Cavity* or hollow of the *Os Petrosam*, by some call'd *Meatus Auditorius Internus*, by others *Concha Interna*, *Tympanum* and *Tympani Cavitas*.

Officula Musculi.

Meatus.

Fenestra.

In this *Cavity* are four little Bones, to which belong three Muscles, two *Meatus's* or Passages, and two Apertures call'd *Fenestra*.

Malleotus.

The first of these little Bones is call'd *Malleolus*, or the Hammer, consisting of a Head and Handle. The Head being round, is Articulated with the *Incus*; it has two little Processes, that towards the

Tym-

Tympanum is short, the other is very long and slender, to the former is fastned a small *Muscle*, which is call'd *Externus*, and coming from the side of the *Meatus* to the Short Process of the *Malleus* draws the Handle of it downwards, by which the *Tympanum* is relax'd, and thereby prevents its being broken by the violent concussions of great Noises. Tab. xix.
Muscles.
External.

Besides this, the *Malleus* has two other Muscles inserted to it: The first that appears in Dissection is not ill describ'd by Mr. *Du Verney*. After Chizeling off the external Surface of the *Os Petrosum*, you'll find it lying near the external Parts of the bony Channel of the *Ductus a Palato ad Aures*, whence ascending it enters the *Tympanum* in an oblique Sinuosity immediately above the bony Circle, to which the *Membrana Tympani* is fixt, and is inserted to a very long slender Process of the *Malleus*. Du Ver-
ney's
Muscle of
the Mal-
leus.

The other Muscle of the *Malleus* was discovered long ago, by *Bartholomeus Eustachius*: It lies in a bony Channel of the *Os Petrosum*, which makes one of the *Parietes Tympani*; one part of this Channel is without the *Tympanum*, and lies in the upper part of the bony Passage, that goes from the Ear to the Palate; the other part which is within the *Tympanum* advances as far as the *Fenestra Ovalis*, and makes in that

Tab. xix. that place a rising, on which, as on a Pulley the Tendon of this Muscle passes to the other side of the *Tympanum*, and is implanted on the hinder or internal part of the Handle of the *Malleus*: Before it enters the *Tympanum*, it is covered with a thick Membranous Sheath: When it Acts it pulls the Handle of the *Malleus* towards the cavity of the *Tympanum*, and makes the external Surface of the *Membrana Tympani* somewhat *concave*; by which the Sounds receiv'd are render'd more acute.

Incus.

The next Bone is the *Incus*, which has: a small Head, and two Legs, resembling a hollow *Grinder* or *Tooth*. The *Basis* or broad Part of this Bone is hollow'd, to receive the head of the *Malleus*: In the middle of which hollow is a small Cavity, wherein is receiv'd the head of the *Malleus* aforementioned. It is fastned by the longer Process, or Leg, to the head of the *third Bone* call'd

Stapes.

Stapes, or the *Stirrop*, from the resemblance to a *Stirrop*. This Bone is situated in a small Cavity of the *Meatus*, call'd the *Fenestra Ovalis*, which it closes exactly.

If you examine this Bone with a Microscope, its sides will be found to be hallow'd grooves, and not simple strait Stems, as a *Stirrop*. Its great Aperture is clos'd with two Membranes, that is, on each side one, so that

that this whole Bone makes a small *flat* Tab. xix. Fig. 3. d, e.
Drum. 'Tis with great difficulty these
 Membranes are preserv'd in Humane Bodies,
 in whom they have been seen, and are
 partly preserv'd by the first Observer Mr.
Comper; but in the *Stapes* of a Calf it is single
 and less liable to break in taking out the
 Bone, and is intirely preserv'd by him.

The *Basis* of the *Stapes* is not pervious,
 tho' its *Center* indeed appears lucid when
 oppos'd to the Light; it is connected to
 the *Foramen Ovale* by Membranes, in such
 manner as admits its rising from thence,
 but is not removed far without lacerating
 those Membranes.

The *Basis* is sometimes found a little con-
 vex towards the *Vestibulum* of the *Labyrinth*
 and Concave towards its Head, but in other
 Subjects it is plain.

The *Stapes* has a peculiar Muscle, call'd Musculus Stapedis. Fig. 3. f.
Musculus Stapedis, the fleshy Belly of which,
 is contain'd in a Channel in the *Os Petro-*
sum, laterally placed to the Branch of the
 hard part of the *Auditory Nerve* by the
Fallopian Aqueduct, whence its Tendon
 marches out into the Cavity of the *Tym-*
panum, and descends (with respect to the
 erect position of the Body) to its termina-
 tion in the Head of the *Stapes*. When it
 acts it draws the *Stapes* laterally, and up-
 wards towards the *Fenestra Ovalis*.

The

Os Orbi-
culare.

Tab. xix.

The next is the *Os Orbiculare* which is a round thin Bone; Concave on one side, and Convex on the other. On the Concave side it receives the Head of the *Stapes*, and the Convex is receiv'd by the Process of the *Incus*.

It has been a general Tradition among *Anatomists*, that these Bones have no *Periosteum*; but it's certain they are not only furnish'd with Blood-Vessels, but have a very thin transparent Membrane all over them, which is continued on both sides of the *Stapes* as above noted.

Cavitus
Tympani

Before we proceed to that part of the Organ of Hearing call'd the *Labyrinth*, we must consider the *Cavity* of the *Tympanum*. This is much less in Humane Bodies than in most *Quadrupeds*, its Figure too varies very much from *them*. It is a hard matter to reconcile the Symmetry of it to any known Cavity: It appears irregular, somewhat archt over the *Membrana Tympani*, but it opens into the *Sinuosity* of the *Mammiform Process* so irregularly, as nothing but the thing it self, or a Figure of it, can transmit any tolerable *Idea* of it, *Vid. Tab. xx. in the Appen. Fig. 16.*

Other Ca-
vities be-
sides those
of the
Mammi-
form Pro-
cess.

Besides the *Cavernulae* of the *Mammiform Processes*, there are divers others that also communicate with the *Tympanum*: These may be seen in breaking up the *Os Temporale* to open the *Tympanum* where the *Incus*

is

is lodg'd: *These* make, as it were, the *Diploe* of the *Os Temporale* in that part, and are irregular *Sinuosities*. *Valsalva* tells us, by an Injection from the *Eustachian Tube*, as he calls that between the *Tympanum* and *Fauces*, he has seen the *Liquor* come into the Cavity of the Skull, and this way he fancies that *Ichor*, *Blood*, or such like Fluids pass from the Cavities of the *Skull* into the *Tympanum*.

Meatus
ad Pala-
tum.
Tab. xix.

From the Cavity of the *Tympanum* opens likewise another Passage, which terminates in the *Fauces* near the *Uvula*, and admits part of the *Air*, which we breath into it. By this passage it is that Persons who are thick of Hearing are suppos'd to assist that Sense by opening their Mouths, which they are generally observ'd to do when they are attentive to any Discourse.

In the Action of *Deglutition*, as the *Musculi Pterygostaphilini* draw the *Uvula* upwards and forwards, they also compress the sides of these *Tubes*, and thereby hinder any part of the masticated Aliment, especially Liquids, from passing into their *Orifices* in the *Fauces*. It is the agitation of the sides of these *Tubes* we hear when we do the Action of *Deglutition*, tho' we have nothing to swallow.

In

Cochlea.
Tab. xix.

In the inner part of the Cavity of the *Tympanum* is a little bony *Globe*, which being broken, discovers that Cavity which call'd the *Cochlea*, from its spiral winding and tortuosity.

Internal Membranes of the Tympanum.

The Cavity of the *Tympanum* is lin'd with a curious fine transparent Membrane adorn'd with *Blood-Vessels*: All the Sinuosities that communicate with the *Tympanum* are invested with this Membrane; hangs very loose about the Tendon of the *Musculus Internus* of *Eustachius*, and very evident on chizelling off the *Os Petrosum* to view the *Tympanum* in a fresh subject; it is continued on the surfaces of the *Incus*, *Malleus*, *Os Orbitale* and *Stapes*; as will appear, if with a magnifying Glass you examine the parts in a fresh Subject, and also continued with the Basis of the *Stapes* to the surface of the *Foramen Ovale*, and not only hinders the *Stapes* from deserting that *Foramen*, but excludes the *Air* of the *Tympanum* from the *Labyrinth*, which comes next to be describ'd.

The Labyrinth or inner Cavity of the Ear.
Fenestra Ovalis, Rotunda.

Besides the openings above-mentioned into the *Tympanum*, there are two other very remarkable. The first of which is clos'd by the Basis of the *Stapes*, and from its Figure is call'd *Fenestra Ovalis*; the other *Rotunda*; this latter is clos'd with a transverse transparent Membrane, plac'd a little within the surface of its aperture towards the

Tym

Tympanum. These *Fenestra* with the whole *Labyrinth* (which we are now going to describe) are comprehended in that part of the *Os Temporum*, properly from its hardness call'd *Petrosum*. The *Labyrinth* according to *Valsalva* may be divided into three parts, *i. e.* The *Vestibulum*, the three *Semicircular Channels*, and the *Cochlea*. Tab. xix.

The *Vestibulum* is a small Cavity of an irregular Form, it is plac'd immediately above the *Basis* of the *Stapes*, between the *Semicircular Channels*, and the *Cochlea*. In this Cavity appear several *Foramina*, as that of the *Fenestra Ovalis*, the five *Foramina* of the *Semicircular Canals*, that of the *Cochlea*, besides five others very small, thro' which so many Nerves pass. Vestibulum.
Foramina

The *Semicircular Canals*, so call'd from their Figure, make up the second part of the *Labyrinth*, which *Valsalva* divides into *Semicircularis Major*, *Minor* & *Minimus*. The *Canalis Semicircularis Major* communicates with the *Vestibulum* by two *Foramina*, the one proper, the other common; the proper lies between the *Foramen* of the *Cochlea* and one of the *Foramina* of the least *Canal*; the common is made by the meeting of the *Major* and *Minor Semicircular Canals*. Canales Semicircularis Major. Fig. 1, 2.

The *Semicircularis Minor* (by some call'd the *Superior*) is the second Canal, that part of it next to the Face is plac'd above the *Vesti-* Minor.

Tab. xix. *Vestibulum*, with which it has a double communication, one by the *Commune*, the other by the *Foramen Proprium*; the *Foramen Commune*, in this, answers exactly to that in the *Major*, but the *Proprium* opens directly above one of the Orifices of the least Canal laterally to the *Fenestra Ovalis* but directly opposite to the *Foramen* of the *Cochlea*.

Minimus. The *Canalis Minimus* is plac'd between Fig. 1, 3, the two former, and is shorter than either of 'em. It communicates with the *Vestibulum* by two *Foramina*, one narrow, the other wider; the lesser *Foramen* lies between the *Foramen proprium* & *Commune* of the largest Canal, and looks towards the *Cochleæ Orificium* & *Fenestra Ovalis*; the larger lies under the proper *Foramen* of the *Canalis Minor*, and looks towards the *Fenestra Ovalis* and *Orificium Cochleæ*; this only of the Semicircular Canals has two proper *Foramina*.

Cochlea. The *Cochlea* makes up the third part of Ib. 5. the *Labyrinth*. It lies directly opposite to the *Semicircular Canals*, and is properly so call'd from the resemblance it has to the Shell that Snails lie in; through its *Parietes* a small Branch of the *Auditory Nerve* passes. Its Canal is divided by a *Septum*.

Septum. This *Septum* is compos'd of two Substances, one almost *Cartilaginous*, the other

other *Membranous*. The two Canals that are divided by the *Septum*, are called *Scala*, Scalae Tympani Vestibuli whereof the one, that looks towards the *Tympanum*, by the *Fenestra Rotunda*, is called the *Scala Tympani*, the other has a communication with the *Vestibulum*, just by the *Fenestra Ovalis*, and is called the *Scala Vestibuli*; the first lies uppermost, and is the largest; the last lowermost, and is the least.

The next part, of which *Valsalva* treats, Canalis Offeus. is the *Canalis Offeus* of the Auditory Nerves, which he divides into Common and Particular, because the first contains both Portions of the Auditory Nerves, the latter only the *Portio Mollis*, the *Communis* is the larger, but the *Particularis* is the longer, the *Communis* descends obliquely towards the *Vestibulum*, and at its end is divided into three small turnings, of which one goes towards the *Cochlea*, the other two towards the *Vestibulum*; in one of these last there is a notable *Foramen*, which makes the beginning of the *Canalis Particularis* call'd *Aquæductus Fallopii*; this is divided Aquæductus Fallopii. into two parts, the shortest of which opens into the Cavity of the Skull, but the other growing larger, is inserted between the *Processus Mammillaris* and *Styliformis*. Through these Canals the two Portions of the Auditory Nerves pass.

Nervi
Auditorii
Pars Du-
ra.

The *Portio Dura*, after it has come to the *Foramen*, where the *Canalis Particularis* begins, runs two ways, one goes into the Cavity of the *Skull* and *Dura Mater*, the other, after it has sent some Branches to the *Tympanum*, goes to the *Foramen*, that opens between the *Processus Mammillaris* and *Styliformis*.

The *Portio Mollis*, at the extremity of the *Canalis Communis*, is divided into two parts, one part of it goes to the Center of the *Cochlea*, the other through the fifth *Foramen* of the *Vestibulum*, which as soon as it enters, makes the *Membrana Vestibuli*.

From this *Membrana Vestibuli*, some other Membranes proceed, which go clear through the *Semicircular Canals*, by *Valsalva* (from their Figure) call'd *Zonæ*, which he makes the *Sensorium* of Hearing.

T A B

Fig. III.

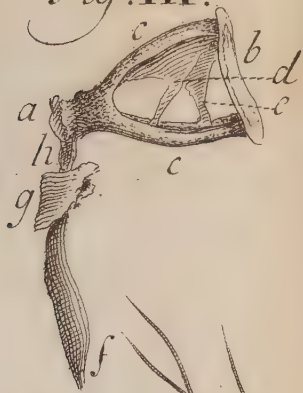


Fig. I.



T. Stapes.

V. Musculus Stapedis.

X. Processus longior Incudis.

Y. Manubrium Mallei.

Z. Membrana Tympani a Malleo
introrsum elevata.

T A B. XIX.

F I G. I. From *Valsalva*.

**THE *Helix* and *Anthelix* of the Ear, looking towards the *Concha*.

A, a *Nerve* that descends from between the first and second *Vertebra* of the *Neck*,

B, A Branch of the same *Nerve* reflecting upwards towards the Ear.

C, A Branch that goes to the lower *Mandible*.

D, A Branch that goes to the *Muscles* of the *Neck*, cut off at its *Origin*.

E, Several Branches that spring from C; one of which goes to the *Parotid Gland*.

F, Branches that proceed from B; a Branch of which likewise goes to the same *Parotid*.

G, Another Branch of B, which runs on the hinder part of the Ear.

H, The place where the Branch G is cauterized to remove the Toothach.

I, A Branch from B, that runs behind the Ear, to the upper part of the Head.

K. The *Portio Dura* of the *Auditory Nerve*, passing out from *Fallopini's Aqueduct*.

L, A Branch of the same Portion divided into more.

MMM, Those that go to the Face.

N, Another Branch of that *Portio Dura*, that sends Branches to the lower *Mandible*.

ooo, A Small Branch springing from the same Portion, which in its tendency towards the upper parts of the Head, look towards the *Meatus Auditorius* and *Auricula*, on whose forepart (tho' here not so clearly delineated) it takes its progress.

P, The Trunk of the *external Jugular*, by which the Blood returns from the Ear.

Q, The *external Branch* of the *Carotid Artery*, which sends the Branches cut off at its Origin, to the *Parotids*, r; the Branches (cut off likewise at the same place) to the back part of the Ear s: Besides these it sends two Branches tt to the fore-part of the Ear, and in its progress sends a notable Branch, u, towards the upper parts of the Head.

R, The *Glandules* of the *Meatus Auditorius*, with its reticular Body.

S, The continuation of the *Meatus Auditorius*, within the *Processus Mamillaris*.

a, The *Fallopian Aqueduct*.

b, The beginning of the *Eustachian Tube*.

c, The Cartilaginous back part of the same Tube.

d, The end of the Tube.

e, The beginning of the *Musculus Pterygostaphilinus*.

f, *Eustachius's Muscle* of the *Malleus*.

1, The largest *Semicircular Canal*.

2, The lesser *Semicircular Canal*.

3, The least *Semicircular Canal*.

4, The *Vestibulum*; in this Position of it, only three of the five *Foramina* (by which the Nerves pass) at first sight appear; a little below these lies a greater *Foramen*, call'd the *Fenestra Rotunda*.

5, The *Canal* of the *Cochlea*, within whose *Circumvolutions* appear the little *Foramina* of the Cavity, by which *Foramina* a part of the *Portio Mollis* enters the *Cochlea*; these *Foramina* appear here larger than the Life.

FIG. II. From the same Author.

SHews the *Membrane* that invests the *Barrel*, *Cochlea*, and the *Zones* of the *Semicircular Canals*, with a Portion of the soft part of the *Auditory Nerves* of their natural size, and in the same view as the Parts that contained them are represented in the preceding Figure 1, 2, 3, 4, 5.
a, The Body of the soft *Auditory Nerve*.

FIG. III.

THE *Stapes* magnified with part of its double *Membrane* that is extended in its hollow, not unlike the Parchment Rackets now in use to strike Shuttlecocks.

a, The head of the *Stapes* in which is a shallow Cavity that receives the *Os Orbiculare*, by the mediation of which Bone the *Stapes* is articulated with the long process of the *Incus*.

b, The *Basis Stapedis*.

cc, Its hollowed sides, to the margins of which its double *Membranes* are fix'd d, e.

d, Part of the *Membrane* of the external Surface.

e, A Portion of the *Membrane* of the internal Surface.

f, The fleshy Belly of the *Musculus Stapedis*.

g, Part of the *Os Petrosum* broke off in freeing the *Muscle* from its *Bony Canal*.

h, The *Tendon* of the *Musculus Stapedis*, passing through the part of the *Os Petrosum* express'd at g, to its Termination in the upper part of the head of the *Stapes*.

C H A P. XIII.

Of the EXTERNAL PARTS *of the* FACE.

S Y L L A B U S

*Partium quæ spectant Externas Faciei Partes
hactenus non descriptas*

Que sunt	{	Frons		
		Tempora		
		Bucca		
		Labia----	Prolabia	
		Mentum		
		Buccula		
		Cuticula		
		Cutis		
		Membrana Carnosa		
		Adeps	{ Frontales	
		Musculi-	{ Subcutaneus	
		Glandulae	{ Buccinator-	
		{ Vasa	Arteria	{ Elevatores } Labii
			Vena	{ Depressores } utriusque
			Nervi	{ Zygomaticus
			Lymphatica	{ Orbicularis

External
Parts of
the Face
enumerated.

BEfore we proceed to the Instrument of *Tast*, it may not be improper to take a View of the EXTERNAL PARTS of the FACE, the Principal of which, (not yet describ'd,) are the *Forehead*, *Temples*, *Cheeks*, *Lips*, *Chin* and *Buccula* or double *Chin*. These all consist and are made up of the common or universal Integuments of the

the whole Body, viz. the *Cuticle, Skin, Membrana Carnosa* and *Fat*, which, with the *Muscles* and *Glands* proper to those Parts, constitute the whole Substance of them.

The *Forehead* has two *Muscles*, on each side one, which are said to spring from the Skull, near the *Coronal Suture*, but their Original has been observed both by *Fallopian* and *Columbus* from the *Occipital Muscles*, or rather that the *Frontales* and *Occipitales* are one continued *Digastric Muscle* on each side moving the *Scalp* and *Skin* of the *Forehead* and *Eye-brows*. That part call'd the *Occipitalis* springs fleshy from part of the *Os Temporale* and *Os Occipitis*, above the Termination of the *Musculus Mastoideus* and *Cucullaris*, and after a small ascent, becomes a thin *Tendon*, which marches over the whole superior Surface of the *Bregma* and *Temporal Muscle*; where it parts with some fleshy *Fibres* to the *Auricles*, and makes the *Attollens Auriculam*; its other part, that covers the *Temporal Muscle*, is thick and *Tendinous*, and is fastned to the *Os Jugale*; and this is what former Anatomists call'd the *Pericranium* running over the *Temporal Muscle*. The superior part of this *Tendon* is exceeding thin, but becomes fleshy after it has pass'd the *Coronal suture*, where it has the Name of *Musculus Frontalis* with *Fibres* passing obliquely to the *Eye-brows*, in which it terminates, and

Muscles
of the
Forehead

in the lower part of the Skin of the Forehead: It has two *Appendages*, the *Superior* or *External* reaches to the *Cartilages*, but is most commonly fix'd to the Bone of the *Nose*: Its *inferior Appendage* lying under the former, is fix'd to the *Os Frontis* at the Margin of the *Orbit* next the *Nose*, and is by *Volcherus Coiter* made a distinct Muscle, by some call'd *Corrugator* from its use in drawing the *Eye-brows* to each other, which we call *Frowning* or *Knitting* the *Brows*.

The Cheeks. The *Cheeks* consisting only of the *common* Integuments already mention'd, and Muscles contributing to the Motion of the *lower Jaw*, we shall refer the Description of them to the Chapter wherein we shall treat of the *Bones* they help to move.

The Lips. The *Lips*, besides the common Integuments, consist of two Parts, the Exterior hard and Musculous, the Interior, soft, spongy and Glandulous, cover'd with a fine Membrane, the fore and protuberant parts of which are red, and call'd by Authors

Prolabia. *Prolabia*. Authors have generally contented themselves to call the Substance of this part a spongy sort of Flesh. But in reality it is Glandulous, as it manifestly shews it self to be by the *Scrophulous* and *Cancerous Tumours* to which it is very subject, and which are proper only to glandulous parts.

Muscles. The *Muscles* of which the outward parts of the *Lips* consist, are either *common* to them

them with other parts, or *Proper*. The *Common* are the third pair of the Nose already describ'd, the *Subcutaneus*, to which some add the *Buccinator*.

The *Subcutaneus* call'd also *Quadratus*, Subcutaneus. arises with a pretty broad Origine from the hinder part of the *Neck*, and from the *Pectoral Muscle* below the *Clavicle*; and is a thin membranous Muscle, running immediately under the Skin. It adheres firmly to the *Panniculus Carnosus*, from which it is difficultly separated, and therefore was not anciently distinguish'd from it, and is inserted obliquely on each side into the lower *Jaw-bone* near the *Chin*, *Lips*, and sometimes the bottom of the *Nose*, all which parts it draws downwards, and a-wry. A Convulsion in either of these Muscles, draws the Mouth a-wry on that side downwards, and is called *Spasmus Cynicus*. Spasmus Cynicus. It reaches sometimes to the *Ears*, which is the reason that some Men have the Faculty of moving them, which others have not, that want this Communication.

Ignorant *Surgeons* have sometimes, in making transverse Sections upon the Neck, divided this Muscle, which lies close to the Skin, and so have occasion'd the Mouth ever after to be drawn towards the other side.

The *Buccinator* serves to draw the *Lips* Buccinator. length-ways, and so to widen the Mouth.

It

It arises from the Internal part of the *Processus Coronæ* of the lower Jaw, (where it joins with the *Musculus Pterigopharyngeus*, and from the upper Jaw-bones near the Gums, whence its fleshy Fibres pass directly to the Termination of the Angle of the Lips. The *Ductus Salivaris superior* from the *Parotid Gland*, passes through the middle of this Muscle into the Mouth.

Muscles
of the Lips.

There are six pair of *Muscles* belonging to the *Lips*, and one single one. Of these three are *Peculiar* to the upper and under Lip, the other three, and the single Muscle are *Common* to both *Lips*.

The *Peculiar* are the *Attollens Labium Superius*, *Deprimens Labium inferius*, *Attollens Labium inferius*.

Depri-
mens La-
bium In-
ferius.

Attollens Labium Superius, springs fleshy from the fourth Bone of the upper Jaw, and expands it self at its Termination on the upper Lip; where it joins with its Partner from the *Septum Narium* to the *Sphincter Labiorum*. The *Deprimens Labium inferius* is placed between the *Depressores Labiorum Communes* on that part call'd the *Chin*. It appears to be but one Muscle ascending with a two-fold Order of fleshy Fibres terminating in the lower Lip. The *Attollens Labium inferius*, arises fleshy from the fore-part of the lower Jaw, immediately under the Gums of the *Dentes Incisores*, and descend to their Insertions to the Skin of the lower part of the *Chin*.

Attollens
Labium
Inferius.

The

The other three Pair which are in Common, are first the *Zygomaticum*, which has its Origine from the *Processus Fugalis*, and is inserted at the corner of the Mouth where the Lips are joyn'd. This is a pritty fleshy smooth Muscle, and draws both Lips laterally upwards. Zygomaticum.

The second Pair, which is by some call'd *Depressor Labii superioris*, is however common to both Lips, and arising with a broad Origine from the lower Margin of the under Jaw by the side of the Chin, is inserted with a narrow Tail into each Lip near their Coalition, and draws them obliquely downwards. Depressor Labiorum.

The third common Pair is the *Attollens Labiorum*, it's placed between the *Zygomaticus* and *Attollens Labium superius*, it arises from the fourth Bone of the upper Jaw, and terminates at the Angle of the Lips under the *Zygomaticus*. Attollens Labiorum.

The last is the *Orbicular Muscle*, which is more strictly proper to the Lips than any of the rest. Its *Fibres* make a sort of ring about the Mouth, and serve to constrict and draw up the Lips. This *Verheyen* contends not to be one Muscle, but a Pair whose *Fibres* meet and joyn at both corners of the Mouth, each acting but upon one Lip only, tho' concurrently. Other Authors are unanimous in calling it one Muscle, and look upon it a *Sphincter*, tho' we think improperly: Orbicularis seu Constrictor.

properly : Because it is not like other *Sphincters* in constant Action, but under the command of the Will, by which differences all other *Sphincters* are distinguish'd from other Muscles. But this is a Controversie of no great Moment.

Blood-
Vessels.

All these parts are serv'd with Blood by some Branches of the *Carotids*, which its Veins carry back to the external *Jugulars*.

Nerves.

Their *Nerves* come from the fifth, sixth, and eighth Pair of the Head, as likewise some Twigs from the *Par Accessorium*, which springs from the *Medulla Spinalis*.

C H A P. XIV.

Of the INNER PARTS of the MOUTH.

S Y L L A B U S.

Partium, quæ sese ostendunt interius in

Oris	{ <i>Tunica Glandulosa</i>	
	{ <i>Uvula-</i>	{ <i>Musculi---</i> { <i>Sphænostaphilini</i>
		{ <i>Ligamenta</i> { <i>Pterygostaphilini</i>
	{ <i>Glandulae-</i>	{ <i>Glossostaphilinus</i>
		{ <i>Conglomerata Palati</i>
		{ <i>Parotides</i>
		{ <i>Tonsillæ</i>
		{ <i>Maxillares--</i> { <i>Exterior</i>
		{ <i>Interior</i>
	{ <i>Gingivæ</i>	
	{ <i>Dentes</i>	

THE Inner Parts of the MOUTH, Glandul-
 are the inside of the *Cheeks* and *Lips*, ous Coat.
 the *Gums* and *Palate*. All these are lin'd
 with a Glandulous Coat, which is conti-
 nued over the whole inner Surface of the
 Mouth, and all its parts, the Teeth ex-
 cepted. From the *Glands* of this Coat,
 through innumerable little excretory *Ducts*,
 is separated a kind of *Salival Juice*, which
 serves to keep the Mouth, and all its parts,
 moist, smooth and slippery.

On the hinder part of the *Palate*, perpen- Uvula.
 dicularly over the *Rima* of the *Larinx*,
 hangs a round soft smooth Body, like the
 end

end of a Childs Finger, form'd from the Duplication of the *Membrane* of the *Palate* which is call'd the *Uvula*, and by some *Columella* and *Gurgulio*, and is moved by two pair of *Muscles*, and suspended by many *Ligaments*.

Muscles.

*Sphæno-
staphili-
nus.*

These *Muscles* are call'd the *External* and *Internal*: The *External* is call'd *Sphænostaphilinus*, it descends from a round fleshy Origination near the root of a *Process* of the *Os Sphænoides*, which lies directly between the *Ala Vespertilionis* and *Processus Styloides*, and is implanted into the posterior part of the *Uvula*, where it joyns with its Partner. This draws the *Uvula* upward and backwards, and hinders the *Masticated Aliment* from passing into the *Foramen Narium* in *Deglutition*.

*Pterygo-
staphili-
nus.*

The *Internal Muscle* of the *Uvula* is call'd *Pterygostaphilinus*, and by *Valsalva*, *Novus Tube Musculus*, as if it had not been known to former Anatomists, because he says, it belongs to the *Meatus à Palato ad Aurē* which he calls *Tuba Eustachiana*. Its Origin is near that of the *Sphænostaphilinus* from the *Os Petrosū*, where the *Tube* from the *Palate* enters that Bone, near an Acute *Process* of the *Os Sphænoides*, and the entrance of the *Carotid Artery*: Here it is fleshy and its lower side adheres to the Cartilaginous part of the *Tube*, and does not spring from the whole fore side of the *Tube*, as

Valsalva

Valsalva would have it; hence it ascends to the *Processus Pterygoides*, where it becomes a broad flat *Tendon*, which expands it self on the fore-part of the *Uvula*, some of which Tendinous Fibres ascend to the lower edge of the *Os Palati*; others descend down the sides of the *Fauces*, where they are lost under the *Amygdalæ*; but the middle *Series* of this Tendinous Expansion, either unites with those of the other side, or are lost in two fleshy Bodies that compose the Body of the *Uvula*.

When this and its Partner act, as they always do together, they not only draw the *Uvula* upwards and forwards, but raise the *Amygdalæ* also, which Action we may observe, when we inspect the *Fauces*. Between the *Uvula* and the *Tongue*, *Valsalva* tells us of a *Muscle*, which altho' small, has a distinct Action, and appears to move the internal *Glandulous Membrane* of the *Fauces*, when we look into these parts in living People: The same Author makes a distinct *Muscle* (belonging to the *Uvula*) of a *Series* of Fibres mention'd in describing the *Muscles* of the *Fauces*. Page 63.

Glossostaphilinus.

Under the *Membrane* of the *Palate*, are a great number of pretty conspicuous *Glands* scatter'd in the fore-part of it, like grains of *Millet* with many *Interstices*, whose *Excretory Ducts* piercing the *Membrane*,

Glands of the Palate.

Glandula
Palatina
Conglo-
merata.

brane, open into the Mouth: But toward the hinder part they lye much thicker, and about the Root of the *Uvula* are gather'd and heap'd so close to one another, that they seem to form one pretty large Conglomerate Gland, which is therefore call'd by *Verheyen*, *Glandula Conglomerata Palatina*.

Gingivæ.

The *Gums*, which are as it were the Ligaments of the *Teeth*, are form'd inwardly of a Production of the *Periosteum* of the Jaws, and of the Membrane of the Mouth already describ'd, which being firmly united, and wrap'd hard about the Root of the *Teeth*, hold them fast in their Sockets as appears by their dropping easily out when the Gums, by any Accident or Distemper, are eaten away or relax'd, and render'd loose and spongy.

These, with the Bones elsewhere to be spoken of, are the Parts that compose the Mouth: Besides which there are in and about the Mouth others, tho' not proper constituent parts of it, yet are highly serviceable and necessary, and therefore properly to be consider'd in this place.

Glands.

Parotides

Of this number are the *Glands*, of which the most considerable are the *Parotides* which have been already describ'd: These tho' situated behind and below the Ears yet have their Excretory Ducts which, run through the *Buccinatores* to the upper Jaw
and

and there discharge 'emfelves into the *Mouth*.

The *Glandula Maxillaris* is a considerable Gland, and of the Conglomerate fort. It is situate on the inside under the lower Jaw-bone near the *Musculus Digastricus*. It discharges it self by several Branches of Ducts, which form one Trunk that passes under the *Musculus Mylohyoideus*, and meets with that of the other side within the fore-Teeth of the lower Jaw, having distinct Orifices with a *Papilla* on each side the *Frænum Lingua*.

Glandulæ
Maxilla-
res.
Tab. 2.
Fig. 2.
K K.

The *Sublinguales* are yet less considerable than these, but of the Conglomerate kind likewise, and lie underneath the Tongue on each side. Their Excretory Ducts are but small, and running parallel with the *Maxillares* approach each other, and open at several Apertures in the same *Papilla*, which are scarce discoverable unless the Glands are press'd.

Sublingu-
ales.
App. Tab.
24. Fig. 8.

The *Tonsillæ*, vulgarly call'd the *Almonds* of the Ear, are situated at the entrance of the *Fauces* on each side the *Uvula* a little below it: They are pretty large Conglomerate Glands, having each of them a considerable *Sinus*, which receives a Mucous Matter from divers lesser ones, and discharges it into the *Fauces* to moisten and lubricate them, and perhaps to facilitate deglutition; because, whenever the Muscles of the *Oesophagus* act, they compress these Glands, and force out a part of their Contents.

Amyg-
dalæ.

Q q

From

From these Salival Organs springs all that Liquor we call the *Spittle*, which flows into the Mouth by the respective Ducts, after its separation from the Blood in the Bodies of the Glands. As the demand of Spittle is greater in Actions of the Lower Jaw, *i. e.* in *Mastication*, *Deglutition*, much Talking, &c. so the disposition of these *Salival Ducts* to favour the discharge on those Occasions is very remarkable. Thus the *Ducts* of the Parotid Glands pass close over the *Musculi Masseteres*, and thro' the *Buccinatores*: The *Salival Ducts* of the *Glandulae Maxillares* pass close under the *Musculus Mylohyoideus*, where the sublingual Glands are placed; by this means the Intumescence of the *Musculi Masseteres* in Chewing accelerate the Spittle in the Parotid *salival Ducts*: As the *Musculus Mylohyoideus* does in the Action of *Deglutition* in drawing the *Os Hyoides* upwards. The agitation of the Cheeks and Lips is sufficient to promote the discharge from the *Glandulae Labiales* and *Buccarum* mention'd in the beginning of this Chapter by the name of the Glandulous Coat.

Foramina
Narium.

Behind the *Uvula* is a considerable large perforation in the Palate, which, at its Office next the *Fauces*, is single, but is immediately divided into two, which go to the respective *Nostrils*, and is each of them capacious enough to admit a Man's little Finger. Thro' these Holes the Air is admitted and expell'd, when the Mouth is shut.

C H A P.

C H A P. XVII.

Of the Os HYOIDES and TONGUE.

S Y L L A B U S

Partium visendarum Circa

Os Hyoides	{	Connexio	
		Figura	
		Situs	
		Basis	
		Cornua	
		Cornicula	Sternohyoideus
			Coracohyoideus
		Musculi	Mylohyoideus
			Genihyoideus
			Stylohyoideus
Linguae	{	Figura	
		Situs	
		Connexio	
		Membrana	Exterior Papillaris
			Interior Reticularis
		Corpus Papillare Nervosum	
		Papillae	Genioglossus
			Ceratoglossus
		Musculi	Styloglossus
			Chondroglossus
			Myloglossus
		Linea Mediana	
		Vasa —	Arteria
			Vena
			Nervi

App.
Tab. xxiii

THE Tongue, tho' no proper part of the Mouth, is, however, its great comfort and ornament, being the sole Or-

Organ of Taste; and the main Instrument of Speech and Deglutition.

Connexion

It is ty'd to the *Os Hyoides*, to the *Larynx*, and to the *Fauces*, and to the lower Parts of the Mouth, by means of the *Frænum*; which is a Membranous Ligament running along the lower side of it, in the middle about half way; tho' sometimes it is extended even to the *Tip* and would in such Persons, if not cut, take away all possibility of Speech.

Os Hyoides or *Bicornæ*
App.
Tab. xxiii
Fig. 5, 6.

At the Root of the Tongue, is plac'd the *Os Hyoides*, and is, as it were the Basis and Foundation of it. This Bone is so called from its imperfect resemblance of the Greek *Upsilon*; and is compos'd in adult Persons generally of three little Bones, and in Children often of five, seven, or more. The middle Bone of the three which is the shortest and broadest is call'd the *Basis*; and the two side Bones the *Horns*, whence it is call'd *Bicornæ* and *Ceratoïdes*.

Basis

The *Basis* is about a Thumb's breadth long, or somewhat more, on the outer side of that Bone which is Convex; and consequently somewhat longer than the inner, which is Concave; it is about half a Finger broad, and thicker in the middle than elsewhere, by reason of a small Protuberance.

Cornua

The *Cornua* or *Horns*, are about an Inch and an half long, and broader at the bottom, than at the Extremities; which are near two Inches asunder.

It

It has two Cartilaginous Processes call'd *Cornicula*, fastned about the Juncture of its *Cornua*, with its Fore-Bone or *Basis*: These *Cornicula* are ty'd to the *Processus Styloides*, by long slender Ligaments, which in some Bodies becomes Bony in divers part: where you will also very often find an elegant small Muscle, between this *Cornicula* and *Processus Styloides*, besides the *Musculus Styloceratohyoideus* and Ligament above mention'd.

Processus
or Appen-
dices

Muscles
in some
Bodies.

Its *Basis* lies as it were upon the Head of the *Larynx*, and its *Horns* are fastned by *Ligaments* to the upper Processes of the *Cartilago Scutiformes*, and to the *Processus Styloides*.

Situation

This Bone is mov'd by five pair of Muscles. The first pair is call'd *Sternohyoideum*, and rises from the upper and internal part of the Bone of the *Sternum*, and part of the *Clavicule*, and adjoining part of the first Rib, with a broad Origine and running over the *Aspera Arteria*, *Glandula Thyroidea*, and *Cartilago Scutiformis* terminates in the *Basis* of the *Os Hyoides*: This draws the Bone strait downwards.

Muscles
Sternohyoideum
Tab. 25.
8.

The second Pair is longer, slenderer and lies deeper. It springs Fleshy, from the superior *Costa* of the *Scapula*, not far from the *Processus Coracohyoides*, and terminates in the *Basis* of the *Hyoides*, whence it is call'd *Coracohyoides*. This is a kind of

Coracohyoides
lb. 6.

digastrick Muscle, having a *Tendon* in its middle, where it passes between the *Musculus Mastoideus* and the Vessels that go to the Head. This draws the Bone backwards and downwards.

Mylohy-
oideum
App.
Tab. 39.
Fig. 4. e. e.

The third is the *Mylohyoideum*, which is a broad, but short Muscle lying immediately under the *Biventer* Muscle of the Jaw, and springs from the lower Margin on each side of the under Jaw, and is inserted into the Basis of the *Hyoides*. It draws the Bone forwards.

Geniohy-
oidium
Ib. Fig. 5. f

The fourth is call'd *Geniohyoideum*, and arises likewise from the forepart internally of the under Jaw, and beneath the former, but with a narrower Head; and this goes to the middle of the *Os Hyoides*, and draws it forwards and upwards.

Stylohy-
oideum
Ib.

The fifth and last Pair, is call'd *Stylohyoideum*, and springs from the *Processus Styloides*, and is inserted into the Basis and Horns of the *Os Hyoides*, and draws it laterally upwards.

Tongue
App.
Tab. xxiii

The main Bulk and Body of the *Tongue* is made up of Muscles, which are covered on the upper Part with a Papillar Nervous substance, over which are spread two Membranes.

External
Mem-
brane

The outer of these Membranes is pretty thick, and soft, and full of *Papillæ*, of Pyramidal Figure, especially towards the Tip; which *Papillæ* stand pointing towards the

the Root of the *Tongue* in a bending Posture, which makes their Figure to be *Concavo-convex*. These *Apices* or *Papillæ*, are so very Minute and Tender in Men, that they make the Coat appear on the upper part to be Villous; especially as they approach nearer to the Root. The Figure of its *Papillæ*, is not in humane Tongues so plainly discernable to the naked Eye, as not to need the Assistance of a Microscope. In Brutes they are generally larger, stiffer, and more conspicuous, and in some almost Cartilaginous, as may be felt in the *Tongues* of *Cats*, *Oxen*, and especially *Lions*, &c. On the under side a little distance from the Tip, this Membrane becomes thin, smooth and glabrous; and as it were Polisht by the lower Parts of the Mouth, upon which it slides.

Under this lies a thin, soft, reticular ^{Inward} kind of *Coat* punct thro' with innumera- ^{Coat} ble Holes, and always lin'd with a thick White or Yellowish *Mucus*. This Membrane is so exceeding Tender, and so full of *Mucus*, that it is not examinable by the naked Eye unless Boiled, by which it grows tough, and easily separable from the external Membrane, and from the Nervous part of the *Tongue* which lies immediately under it: After Boiling it appears like a kind of *Gawse*, between whose Threads innumerable Holes appear,

thro' which the *Apices* of the *Papillary Body* underneath it are exerted. This Membrane on the upper side next the outward appears White, with a cast towards Yellow, but black on the side next the Tongue.

Why allow-
ed to be a
Mem-
brane.

Many *Authors* do not allow this as a Membrane, and will have it only to be a *Mucus* hardned by Boiling: But since it has so much of the resemblance of a Membrane; and that *Authors* do agree in allowing two Membranes to the Tongue, I have not scrupled to number it among them, since it does not appear to me that there is any other second Membrane, or Coat of the Tongue in general, reckoning with *Malpighius*, the smooth part under the Tongue, to be part of the outer Membrane.

Corpus
Papillaræ
Nervo-
sum

Immediately under this appears a *Nervous Papillary Body*, spreading it self to a pretty thickness over the whole Surface of the Tongue. This Body is on the under side every where level and smooth, except in some few places where it is connected to the adjacent *Muscalous* Part by some Nervous Twigs, which it sends into it.

Papillæ

The *Papillæ*, which compose this Body, are by the most accurate, *Malpighius* (who has been the most curious and successful Observer of this Part) distinguisht into three sorts, from their different Magnitudes and Figures observ'd by the *Microscope*; of which those seated on the Sides and Tip are

are very singular, resembling little round *Pyramids*, with Globes on their tops, like the Horns of Snails. All these *Papillæ*, which are the immediate Organs of *Tasting* send their *Apices* or Extremities thro' the *Mucous Membrane*, into the *Pyramidal Papillæ* of the outward Membrane, which are all hollow to receive them, and seem to be nothing else but a sort of Cases to defend these Nervous *Papillæ* from Injuries, which the Salts and Asperities of those Bodies, which we take into our Mouths, might do them.

The rest of the Body of the *Tongue*, consists of *Muscles*, which makes far the greatest part of it. *Authors* are not agreed about the number of the *Muscles* which compose it; some confounding those of the *Os Hyoides* and the *Tongue*, reckon eight, nine, ten, and more Pair. Some Number those proper to the *Tongue* alone six Pair, others five, others but four, and some will allow no more than three, as real distinct *Muscles*.

In this perplexity of Accounts, which is more Confus'd than Momentous, I shall follow that, which is the most Simple, but most Instructive, which is that of our ingenious Country Man Mr. *Comper*, whose great Skill and Experience in *Anatomy* is sufficient to warrant his Account. He rejects the subdivision of those who unnecessarily Multiply

tiplied them to six Pair, and in his Book of the Muscles allows but three genuine Pair of Muscles to the Tongue, which are the *Par Genioglossum*, *Ceratoglossum*, *Styloglossum*, nam'd from their Origines and Insertions.

Genioglossum

“ The *Genioglossum* lies immediately under the *Geniohyoideum* before describ'd.
 “ They arise fleshy from the forepart of the lower Jaw internally, and enlarging themselves, are inserted into the Root of the Tongue; when these Act they pull the Tongue forwards, and thrust it out of the Mouth.

Ceratoglossum

“ The next is call'd *Ceratoglossum*, which has a broad fleshy Origination, at the superior part of the *Os Hyoides* laterally, whence it ascends to its Insertion at the Root of the Tongue. This with its Partner Acting, draw the Tongue into the Mouth directly, if one of them act only, it moves it on one side.

Styloglossum

“ The third is *Styloglossum*, this runs off sharp and fleshy, from the *Processus Styloides*; whence descending obliquely forwards, it is inserted into the Root of the Tongue, immediately below the implantation of the former. This pulls the Tongue up in the action of Deglutition as was before noted.

Mr. *Comper* mentions the consent of most Authors, except *Fallopins*, in the existence of the *Bassiglossum*, and his Thoughts there-

thereupon, in farther satisfaction of which, he does, upon inquiry, find some Fibres, which by their contrary Order to those of the *Genioglossum*, encourages him to allow the *Basioglossum*, which, together with the foremention'd, makes the Body of the Tongue, and may serve to draw it towards its *Basis*.

Besides these, *Verheyen* mentions two Chondro-
other Pair, one very small one, which he glossum.
calls *Chondroglossum*, a very short and narrow pair, which arise from the Cartilaginous Processes of the *Os Hyoides*, and meeting in the middle of the *Basis* of the Tongue are inserted there, forming a kind of Arch under it. This pair has been maintain'd by so many Authors, that 'tis probable it may be found in some subjects, but not constantly nor generally. This liberty of adding, and omitting parts less principal, is frequently taken by *Nature*, in some of more moment than this pair of Muscles.

The sixth pair, mention'd by *Spigelius* under the Name of *Myloglossum*, and which *Verheyen* doubtingly fancies himself to have seen, is so obscurely describ'd, and stands upon such slender Authority, that it is not worth further mention. Myloglossum.

Down the middle of the Tongue, length-
wise, runs a Seam, which divides it to the
bottom into two equal parts, but not so
effectually. Linea
Mediana.

effectual but that the Blood-Vessels of one side communicate with those of the other.

Vessels.

These *Vessels* are *Arteries* from the *Carotides*, and *Veins* call'd *Ranula*, and are very conspicuous about the *Frænum* under the Tongue, which re convey the Blood to the External *Jugulars*. These *Veins* are frequently open'd in the *Angina*, and is the *Anchora Sacra* of *Old Women* and the *Vulgar* in those Cases. The Nerves of the Tongue come from the fifth and sixth and ninth pairs. The two first of which have been call'd *Gustatorii*, and the latter *Motorii Linguae*.

Before we come to the *Artus*, it may not be improper to lay down a Plan of the general distribution of the Blood-Vessels, this seems to be best done by Figures, tho' some *Anatomists* have taken a great deal of Pains to very little Satisfaction without. It must be confest Nature is not regular even in the largest Trunks of the *Arteries* and *Veins*, which has given occasion to some *Anatomists* of censuring others as Incorrect, when in truth it has arisen from the diversity in subjects; as is well known to Experienc'd *Anatomists*. The annext Figure of the *Arteries* you may depend upon as done from the *Life*. The Trunks of *Veins* being less certain than the *Arteries*,
we

we don't at present think it necessary to add any other Figure of them than what you find in the *Appendix, Tab. 3.* The inquisitive may find a Figure of the *Veins* lately done from the Life, in the *Philosophical Transactions* N^o 280. in the Year, 1702.

T A B.

T A B. XX.

1. **T**HE *Aorta* or *Arteria Magna* cut from its Origin at the Orifice of the left *Ventricle* of the *Heart*.

A. The three semilunary Valves of the *Aorta*, as they appear when they hinder the Blood coming back into the Left *Ventricle* when the *Heart* is in *Diastole*.

2. The Trunk of the great *Coronal Artery* of the *Heart*, arising from the beginning of the *Aorta*; the rise of the lesser *Coronal Artery* not appearing in this position of the *Arteria Magna*.

3. *Ligamentum Arteriosum*.

4, 4. The *Subclavian Arteries* arising from the *Arteria Magna*, to which the *Axillary Arteries*, and those of the *Arms* (23, 23,) are continued.

5, 5. The two *Carotid Arteries*, the right arising from the *Subclavian*, the left from the *Aorta*.

6, 6. The two *Vertebral Arteries* arising from the *Subclavicle*, which pass through all the *Transverse Processes* of the *Vertebrae* of the Neck, from whence they are here freed.

7, 7. The *Arteries* which convey Blood to the lower part of the *Face*, *Tongue*, adjacent *Muscles*, and *Glands*.

8, 8. The Trunks of the *Temporal Arteries* springing from the *Carotids*, and giving Branches to the *Parotid Glands* (9, 9.) and to the neighbouring *Muscles*, hairy *Scalp*, and *Forehead*.

10, 10. Trunks which send Blood to the *Foramina Narium*, particularly the *Glands* of its *Mucous Membrane*.

11. The

11, 11. The *Occipital Arteries*, whose Trunks pass close by the *Mammiform Process*, and are distributed on the hinder part of the *hairy Scalp*, where they are Inoculated with the Branches of the *Temporal Arteries*.

12. Arteries, which carry Blood to the *Fauces*, *Gargareon*, and *Muscles* of those Parts.

BB. A small portion of the *Basis* of the *Skull*, that is perforated by the Artery of the *Dura Mater*, here express with part of the *Dura Mater* remaining to it.

13, 13. The contortions of the *Carotid Arteries*, before they pass the *Basis* of the *Skull* to the *Brain*.

14, 14. Those parts of the *Carotid Arteries*, where they pass by each side of the *Sella Turcica*, where divers small Branches do arise from them, and help to compose that *Rete Mirabile*, which is more conspicuous in *Quadrupeds*, than Men.

C. The *Glandula Pituitaria*, taken out of the *Sella Turcica*, lying between the two contorted Trunks of the *Carotid Arteries*, 14, 14.

DD. The *Arteria Ophthalmica*, which spring from the *Carotids* before they enter the *Pia Mater*.

15. The contortions of the *Vertebral Arteries* as they pass the *Transverse Processes* of the first *Vertebra* of the *Neck*, towards the great *Foramen* of the *Os Occipitis*. We have more than once taken notice, that the Cavities of these Arteries, where they are contorted, have been larger than their inferior Trunks, whereby the Impetus of the Blood must necessarily be very much lessened, as well as by their contortions only. In *Quadrupeds* the Angles of three contortions of the *Arteries* of the *Brain* are more acute

acute, which in them is the more necessary to lessen the force of the Blood at their extremities, by reason of the Horizontal Position of their Trunks.

16, The two Trunks of the Vertebral Arteries, that lie on the *Medulla Oblongata*.

17. The communicant Branches between the *Carotid* and *Cervical* Artery.

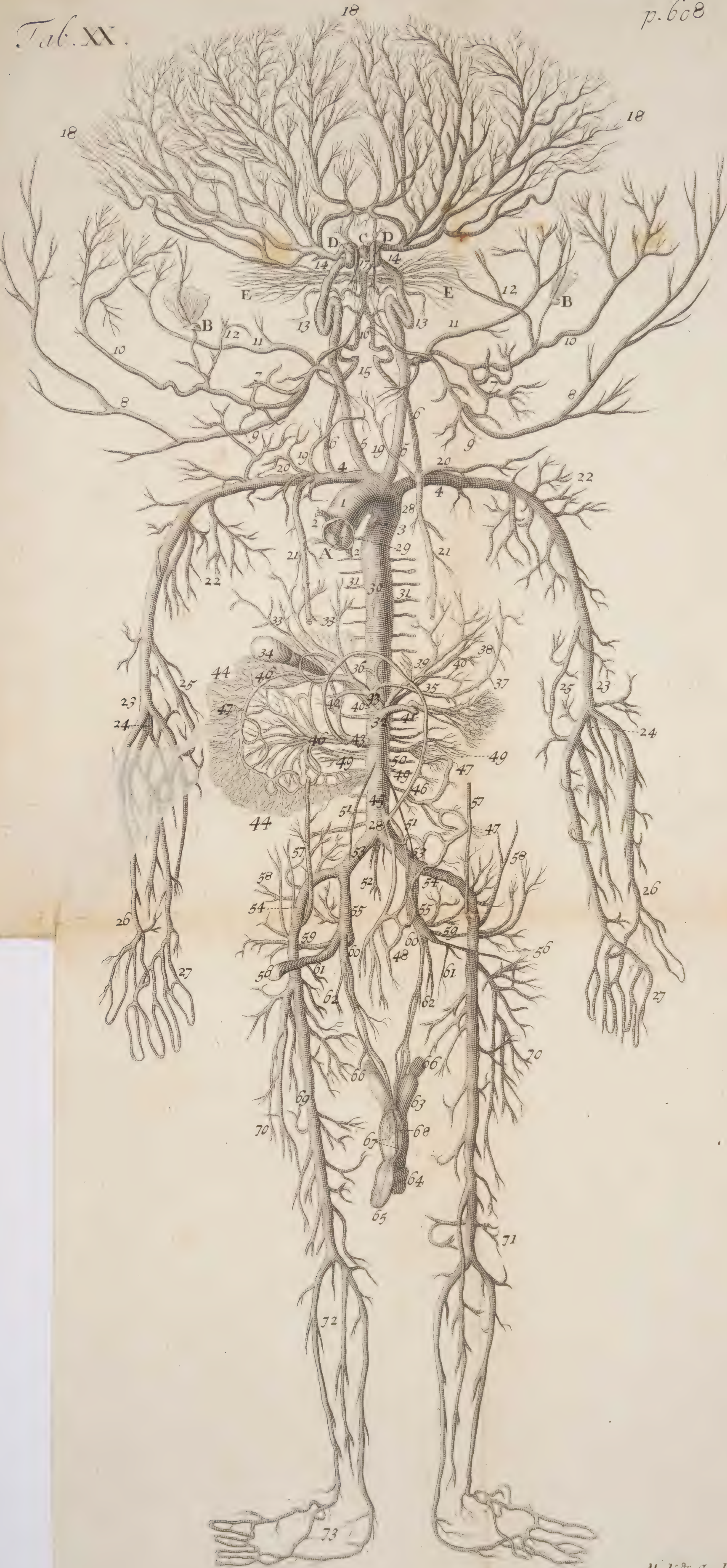
18, 18. The ramifications of the *Arteries* within the *Skull*; the larger Trunks of which lie between the *Lobes* of the *Brain*, and in its *Sulci*. From the extremities of these *Arteries* of the *Brain*, are continued its *Veins*, whose Trunks vary much in their continued Position from the *Arteries*: They entering the *Brain* at its *Basal*, and distributing themselves, as above noted; whereas the Trunks of the *Veins* are extended on the surface of the *Brain*, and discharge their Blood into the *Longitudinal Sinus*. Nor do the *Veins* of the *Brain* accompany their *Arteries* at their Ingress, as in other Parts: As the *Arteries* and *Veins* of the *Dura Mater* do, both which pass through the same *Foramen* in the *Basal* of the *Skull*, B B.

E E. The Arteries of the *Cerebellum*.

19, 19. The Arteries of the *Larynx*, *Thyroid* Glandules, and adjacent Muscles and Parts, arising from the *Subclavian* Arteries.

20, 20. Others arising near the former, which convey Blood to the Muscles of the *Neck* and *Scapula*.

21, 21. The *Mammaria*, which arise also from the *Subclavian* Arteries, and descend on the *Cartilages* of the *true* *Ribs* internally, about half an Inch distant on each side the *Os Pectoris* or *Sternum*. Some Branches of these pass thro' the *Pectoral* as well as *Intercostal* Muscles, and give





give Blood to the *Mamma*, where they meet with some Branches of the *Intercostal Arteries*, to which they are *Inosculated*.

These *Mammery Arteries* join with the large Trunks of the *Epigastricks* (57, 57.) also, by which means the *Impetus* of the Blood of the Integuments of the *Abdomen*, is carry'd on with more force ; the *Extremities* of the *Intercostal* and *Lumbal Arteries* also *Inosculate* with each other, as well as these.

22, 22. The Arteries of the Muscles of the *Os Humeri*, and some of those of the *Scapula*.

23, 23. Those Parts of the large Trunks of the Arteries of the Arm, which are liable to be wounded in opening the *Vena Basilica*, or innermost of the three Veins in the bending of the *Cubit*.

24, 24. The divisions of the Arteries of the Arm below the *Flexure* of the *Cubit*.

25, 25. A communicant Branch of an Artery arising from the Trunk of the Artery of the Arm above its flexure at the *Cubit*, which is *Inosculated* with the Arteries of the *Cubit* below. In some Subjects you will not find this communicant Branch, as here represented ; in whom there are divers smaller Branches of the same kind. By these communicant Branches (of the upper part of the *Brachial Artery* with those of the *Cubit*, the Blood still passes, tho' the Trunk (23.) is firmly tied, which is done in taking up the Artery, as it's call'd when 'tis wounded, in the case of an *Aneurisma* : Besides firmly tying the Trunk of the Artery above the Place where it is wounded ; it is also necessary to tie it in like manner below, least the Blood, convey'd by the communicant Branches

to the inferior Trunk, still pours out at the wound of the Artery from below, in a *Retrograde* manner.

26. The *external* Artery of the *Cubit*, which makes the Pulse near the *Carpus*.

27, 27. The Arteries of the *Hands* and *Fingers*.

28, 28. The descending Trunk of the *Arteria Magna*.

29. The *Arteria Bronchialis* springing from one of the *Intercostal* Arteries ; it sometimes arises immediately from the descending Trunk of the *Aorta*, at other times from the *Superior Intercostal* Artery, which springs from the *Subclavian*. These *Bronchial* Arteries *Inosculate* with the *Pulmonary* Arteries, *Vid. Ruysch. Epist. Anatom. 6. Fig. c, c, c.*

30. A small Artery springing from the forepart of the *Aorta Descendens*, passing to the *Gula*. *Ruysch* tells us of Branches of Arteries from the *Superior Intercostal*, which go to the *Gula*.

31, 31. The *Intercostal* Arteries on each side the *Arteria Magna Descendens*.

32. The Trunk of the *Arteria Cœliaca*, from whence spring

33, 33. The *Hepatick* Arteries, and

34. The *Arteria Cystica*, on the *Gall-Bladder*.

35. *Arteria Coronaria Ventriculi Inferior*.

36. The *Pylorica*.

37. The *Epiploica Dextra, Sinistra*, and *Media*, springing from the *Coronaria*.

38. The Ramifications of the *Coronary* Artery, which embrace the bottom of the *Stomach*.

39. *Coronaria Ventriculi superior*.

40, 40. The *Phrenick* Arteries, or the two Arteries of the *Diaphragm*, that of the *left* side arising from the Trunk of the *Arteria Magna*, the *Right* springing from the *Cœliaca*.

41. The Trunk of the *Splenick* Artery, arising from the *Cœliaca*, contorted.

42. Two small Arteries going to the upper part of the *Duodenum* and *Pancreas*; the rest of the Arteries of the *Pancreas* spring from the *Splenick* Artery in its Passage to the *Spleen*.

43. The Trunk of the *Arteria Mesenterica Superior*, turn'd towards the *right* side.

44, 44. The Branches of the *Superior Mesenterick Artery*, freed from the small Guts; Here the various *Anastomoses*, the Branches of this Artery make in the *Mesentery* before they arrive at the Intestines, may be observed.

45. The *Inferior Mesenterick Artery* arising from the *Arteria Magna*.

46. A remarkable *Anastomosis* of this *Inferior Mesenterick Artery* with the *Superior*.

47, 47. The Branches of the *Inferior Mesenterick Artery*, as they pass to the *Intestinum Colon*.

48. Those of the *Rectum*.

49, 49. The *Emulgent Arteries* of the *Kidnies*.

50. The *Vertebral Arteries* of the *Loins*.

51, 51. The *Spermatick Arteries*, which descend to the *Testes*, and are so small, as to escape being fill'd with Wax.

52. *Arteria Sacra*.

53, 53. *Arteria Iliaca*.

54, 54. *Rami Iliaci Externi*.

55, 55. *Iliaci Interni*; which are larger in the *Fœtus* proportionably, than in the *Adult*,

by reason of their Conjunction with the two *Umbilical Arteries*.

56, 56. The two *Umbilical Arteries* cut off: That of the *Right* side being Drawn as in the *Fœtus*; the *Left* is exprest as in an *Adult*.

57, 57. The *Epigastrick Arteries*, which ascend under the *right* Muscles of the *Abdomen*, and are Inosculated with the *Mammaria*, as above noted.

58, 58. Branches of the *External Iliack Arteries*, passing between the two *oblique* Muscles of the *Abdomen*.

59, 59. Branches of the *Internal Iliack Arteries*, which convey Blood to the *extensores* and *obturatores* Muscles of the *Thighs*.

60, 60. The Trunks of the Arteries which pass to the *Penis*.

61, 61. The Arteries of the *Bladder* of *Urine*.

62, 62. The *Internal Arteries* of the *Pudendum*, which with those here exprest of the *Penis*, make the *Hypogastrick Arteries* in *Women*. The *External Arteries* of the *Pudendum*, arise from the upper part of the *Crural Artery*, which is immediately below the *Epigastricks*.

63. The *Penis* distended with Wind and dry'd.

64. *Glans Penis*.

65. The upper part, or *Dorsum Penis* cut from the Body of the *Penis*, and rais'd to shew the *Corpora Cavernosa Penis*.

66, 66. *Corpora Cavernosa Penis* freed from the *Ossa Pubis*, and tied after Inflation.

67. The two Arteries of the *Penis*, as they appear injected with Wax, in each *Cavernous Body* of the *Penis*.

68. Th

68. The *Capsula*, and *Septum* of the *Corpora Cavernosa Penis*.

69. The *Crural Arteries*.

70, 70. The *Arteries* which pass to the *Muscles* of the *Thighs* and *Tibiae*.

71. That part of the *Crural Artery* that passes the *Ham*.

72. The three large *Trunks* of the *Arteries* of the *Leg*.

73. The *Arteries* of the *Foot*, with their communicating *Branch*, from their *Superior* to their *Inferior Trunk*, as well as their communications at the extremity of each *Toe* like those of the *Fingers*.

C H A P. XVIII.

Of the BONES in general.

SYLLABUS

Eorum quæ pertinent in genere ad

Ossa	{	Periosteum					
		Cartilagines					
		Genera duo Ossium					
		Textura	{	Lamillæ Parietum	{	Ossæ	
				Fibræ			Longitudinales
							Transversæ
				Cellulæ			
				Cavitas Major — in Artubus			
		Medulla	{	Cavitatis Majoris			
				Cellularum			
Glandulæ Artuum Mucosæ							
Ligamenta							

DEsigning to treat of the *Parts* for local Motion together, it will not be improper, for Method sake, to give some Account of what is peculiar to each *Species* by it self.

I shall begin with the *Bones* which are the Frame, and as it were the Timber work, which sustains the whole *Machinery* and in these I shall consider their *Membranes* *Structure*, *External* and *Internal*, their *Contents* and their *Connections* with each other.

How a Bone is distinguish'd from other Parts, and what are its *Characteristick* Marks

that appear to Touch and View, has been already told in the *Initial Chapter* of this Work; where all the *Genital Parts*, as well *Fluid as Solid*, are in a few Words describ'd. I come now to those Things which are more particular.

Every Bone is cloath'd externally with a pretty tough, and extreamly sensible Mem-^{Periofte-}brane; which covers the whole exterior^{um} Surface, and is common to the same upon all Bones of the Body, even the little ones within the *Tympanum* of the *Ear*, not excepted. It is deriv'd from the *Dura Mater*, and consists principally, tho' not wholly, of Fibres drawn from thence which are *Rectilineal*, besides which it receives some other Fibres (but not in equal Proportion to these) from the *Membrana Communis Musculorum*, (or as Dr. *Havers* imagines, from the Carnous Fibres of the *Belly* of the Muscles) which intersect the former variously in different Parts. It is every where thin, tho' not alike so in all Parts. It adheres closely to the Bone, and in some Places is observ'd to send Fibres into the very substance of it: Its principal Use seems to be to defend the Muscles and Tendons from being fretted in their Action, by Attrition from the hard substance of the Bones, and to give notice by its sensibility of any thing that might annoy the Bones, which are in themselves insensible.

The external Face of the Bones which appear upon the removal of this Membrane, has been describ'd among the Parts in general.

Two sorts
of Bones

The Bones are of two sorts, such as have a notable Cavity within, which is fill'd with a sort of *Fat* call'd *Marrow*, as the Bones of the Arms and Legs, &c. or such as have no such Cavity or Marrow, as the Bones of the Skull and Ribs, &c.

Texture

Both these sorts of Bones are laminated, or consist of several *Strata* or rigid Fibres, which are of the same Substance with the whole *Aggregate* of the Bone, strictly so call'd, of which most are *Longitudinal*, but intersected with cross Bars or Fibres of the same Matter; whence are form'd *Loculi*, or little Cavities, which are fill'd with a sort of *Oyl*, which serves to keep them from being too Brittle and Plyable.

Oyl, how
separated

This *Oyl*, which is the thinnest and most fluid Part of the *Fat*, is separated from the Blood, (convey'd by the Arteries thro' peculiar Perforations made peculiarly for them, which the Veins return after the separation of the *Oyl*;) by means of certain little Vesicles lodg'd in these *Cellule*, and in this Hollow of the great Bones which are or do the Office of Glands in this Case.

Marrow

The great Bone of the *Arm* and *Leg* have large Cavities within their *Parietes*, fill'd with

with a peculiar sort of *Fat* called the *Meddulla*, or *Marrow* of the Bones, which is contain'd in innumerable *Sacculi* or Membranous Bags, which are continu'd to, and open into one another, and make the whole appear as one Body or Lump. At each end of these Bones is one or more Perforations, thro' which part of this *Fat* is discharg'd into the Joints, of which by and by.

Those Bones which have no such Hollow and Marrow, have however like these Laminated *Parietes*, tho' not so thick, and between them a sort of Spongy Cavernulous substance, which receives from the Vessels, as the other do, a greasy Substance, which serves for their Nourishment and Maintenance.

C H A P. XIX.

Of the Connection of the BONES.

S Y L L A B U S

Modorum quibus Ossa Connectuntur

Arthroſis

Diarthroſis

Enarthroſis
 Arthrodia
 Ginglymus triplex

Cum eadem Oſſa ſe mutuo excipiunt
 Cum idem Os excipitur & excipit
 Cum idem Os utrinq; excipitur

Symphyſis triplex

Sutura { Spuria
 Vera
 Harmonia
 Gomphoſis

Synarthroſis

Syſſarchoſis
 Synchondroſis
 Syneuroſis
 Syntenofis
 Synymenſis

ALL the Bones of the Body (which tho' differing in number in ſeveral Subjects, are however above three hundred in thoſe that have feweſt) are join'd together, and make one *Compages* or *Frame*.

The manner likewise of their being join'd is various, according to the purpoſes for which

which they are put together, some being design'd for *Motion*, others for *Rest*, and the support of the incumbent Parts only.

That juncture which is design'd for Motion is call'd *Arthrosis* or *Articulation*, and is again divided into two sorts; one, which has a notable and manifest Motion, which is call'd *Diarthrosis*, and the other which has an obscure one only and is call'd *Synarthrosis*. Arthrosis
Diarthrosis
Synarthrosis

The *Diarthrosis* is again subdivided into three sorts of Articulation, *Enarthrosis*, *Arthrodia*, and *Ginglymus*.

It is call'd *Enarthrosis*, when a large protuberant Head is inserted into some deep Cavity, which is call'd *Cotyle* or *Acetabulum*, or in English a Socket. Enarthrosis

Arthrodia, is when a flat Head is received in a shallow Socket, as in the insertion of the *Os Humeri* into the *Scapula*. Arthrodia

Ginglymus is when a Bone inserts it self into another, and receives a third or the same. Ginglymus

The *Ginglymus* is again subdivided into three sorts.

The first is when two Bones mutually receive one another, as those of the *Cubitus* and *Humerus* do, like a *Hinge*.

The second is when it receives one Bone, and is received by another, as the *Vertebrae* do.

The

The third is after the manner of an *Axle* of a Wheel in a Box, as the first *Vertebra* of the Neck, with the second.

Synarthrosis

The *Synarthrosis*, which has but an obscure Motion, is divided into *Symphysis*, *Sutura*, *Harmonia*, *Gomphosis*, *Syssarcosis*, *Synchondrosis*, *Syneurosis*, *Syntenosis*, *Synmenesis*.

Symphysis

That juncture of the Bones which is for absolute Rest, is call'd *Symphysis* or *Coalition*, of which there are likewise three sorts.

Sutura

Raphe or *Sutura*, which is when Bones are join'd by uneven Edges, and are as it were indented, or sometimes shooting over each other.

Harmonia

The second sort is call'd *Harmonia*, which is when the Bones meet with even Margins in a Line, as those of the upper Jaw.

Gomphosis

The third is *Gomphosis*, which is like fixing a Peg or Nail into a Hole, which sort of Joynting is proper to the Teeth only.

Syssarcosis

There are besides these, five other sorts of Connexions. The first of which is call'd *Syssarcosis*, which is when the Bone is join'd to or by a fleshy Part as the *Os Hyoides*.

Synchondrosis

The second is *Synchondrosis*, which is by an intermediate Cartilage, as the Ribs are join'd to the *Sternum*.

Syneurosis

The third is *Syneurosis*, which is a Connexion by a Ligament as is that of the *Os Femoris*, to the *Os Ischii*.

Syn-

The fourth is *Syntenosis* which is join'd by a Tendon as the *Patella* is to the *Tibia*, The *Ossa Sefamoidea*, &c. Synteno-
sis.

The fifth is *Synymensis* and is a Conjunction by Membranes, as in new-born Children the *Ossa Syncipitis* are join'd with the Occipital and Frontal Bones. Syny-
men-
sis.

The *Junctures* are likewise divided by Authors into *Genuine* and *Spurious*: The *Genuine* is that which is indented like the *Teeth* of two *Saws*, as the *Sutura*, *Coronalis* and *Lamdoides*; and the *Spurious* is that which Shoots over as the *Sutura Temporalis*. Sutura
Vera
Spuria

A
NEW SYSTEM
OF
ANATOMY.
BOOK IV.

C H A P. I.

*Of the MUSCLES and Mucilaginous Glands,
in general.*

S Y L L A B U S.

*Eorum quæ sunt maxime Spectatu digna in ge-
nere Circa.*

Musculos	{	Pinguedo Interstitiorum	
		Membrana Musculorum	{ Communis Propria
		Glandula-	{ Musculorum Mucosæ Artuum Mucosæ
		Ligamenta	
		Musculo- rum	{ Insertio duplex in { Caput Tendines duo { Caudam Venter Fibrarum Carnearum
Glandulas Artuum	{		{ Arteria Vasa { Vena Nervi Lymphatica
		Situs	
		Figura	
		Mucus	

AS the Bones are the *Frame*, and the
Joints the *Pullies* or *Hinges* on which
the *Animal Machine* moves : So the
Muscles resemble the *Chords* which draw it
to and fro.

The

The **MUSCLES** are the *Instruments* of Muscles
Voluntary Motion, and have been already Instru-
 so far describ'd as to their distinct Members, ments of
 as not to need a repetition here. Motion.

The *Belly*, which is the Part principally Belly the
 affected in the *actions* of a *Muscle*, consists active Part.
 of carnous Fibres, which are now generally
 (how true soever) thought to be only *Pro-*
ductions of the *Arteries* and *Veins*, by the
 Intumescence of whose *Contents* the Extre-
 mities are drawn nearer together, and by
 consequence the Bone to which the move-
 able Part is fixt, is approximated to the
 immoveable, or less moveable.

Many *Hypotheses* have been offer'd to ac- Hypothe-
 count for this *voluntary Motion*; but I, who sis not sa-
 must confess my Ignorance of the means by tisfactory.
 which the *Soul* acts upon the *Body*, cannot
 acquiesce in any of them, nor pretend to
 offer any of my own.

Some will have the *Animal Spirits* the
Primum Movens; but besides, that their
Existence is not to me *demonstratively* prov'd,
 the manner of their *Action* assign'd by Au-
 thors is altogether arbitrary and precarious.

Some, after the great Dr. *Willis*, make
 the *Tendons* a Receptacle for the *Spirits*
 which are to be rais'd at the Instigation of
 the *Will*, and sent into the *Body* of the Mus-
 cle, there to ferment with the Blood, and
 cause an Intumescence, by some fanciful
 way or other they know not how.

Others,

Others, who allow no Receptacle for them but the Brains, send them from thence through the Nerves like *Lightning* on all the *Errants* of the *Will*; because they cannot allow the *Tendons* to be a proper lodgment, upon the account of the closeness of their contexture; nor can believe that the Spirits should remain there unactive. But how right soever they may be in their Objection, they offer no more Demonstration for their own Opinion, which is liable to a many Exceptions, were it worth while to amuse the Reader with them.

It is certain from Fact and ocular Demonstration, that the *Belly* of the *Muscle* does swell in its *Actions*, and that a *Ligature* laid upon the *Artery* or *Nerve*, that serves any Muscle, will totally impede its Action: From whence it is plain that both of them, some way or other, do contribute to it.

By Injection of warm Water through the *Arteries* into the Muscles of Bodies after Death, we find that Contractions may be procur'd; which, besides the Experiments of Ligature, sufficiently shew the share that the Blood has in their Actions. But whether in living Bodies this Intumescence of the Muscle proceeds from the extraordinary quantity of Blood irruent in the time of Action; or from any sudden Expansion of the ordinary quantity circulating thro

it is hard to determine, since either Accident is possible, and the Causes of either equally obscure.

But leaving the *active Cause* of *voluntary Motion* to those that are better able to find it out, I shall proceed to the Description of those Parts, which have not been already mentioned in the general *Idea* of a *Muscle*, in the first Chapter of this Work.

Besides the *common Teguments* of the *Muscles*, each Muscle has a *proper Membrane* which encloses the whole Muscle, and is more strictly wrapt about the *Tendons*.

The Body of the Muscle consists of fleshy Fibres, which, according to the late receiv'd Opinion, are nothing else but the Capillaries of *Arteries* and *Veins* inosculating with, or continu'd to each other. This Opinion however receiv'd, appears in my Mind to be justly questionable, since, besides the Membrane which encloses the whole Muscle, there are others (probably Productions of the same Membrane) which divide the Muscle into innumerable *Fasciculi* or bundles of Fibres, which may, for any thing we have been able to trace, be serv'd only with one small Artery and Vein; and this disposition seems more commodious for the expansion of the Blood in the Muscle, than is its circulation thro' continual Tubes. In which Opinion I am

countenanc'd by the singularity of that Intumescence, and Detumescence, without damage, which is proper to the Muscles only, and not only proper, but necessary to their Action, and to theirs only of all the Parts of the Body.

This makes me think the Observations made by the Microscope upon the circulation of the Blood in the Tail of little *Eels*, *Newts*, *Tad-poles*, &c. no demonstrative Proof of the continuity of the Vessels in every Part, since it is seen only in the edges and extremities where the Blood is necessary only for Nutrition, and not in the musculous or moving Parts.

Fat of the
Intersti-
ces of the
Muscles.

In the Interstices of these *Fasciculi* of Muscular Fibres are plac'd small parcels of Fat, scarce perceptible to the naked Eye in a Humane Subject, but visible enough by the help of a Microscope. These were however plainly enough discover'd by that accurate Anatomist Dr. *Tyson*, in the Dissection of a *Porpeff*. Their use may reasonably be suppos'd to be the Lubrication of those Muscles or *Fasciculi* of Fibres, thereby to hinder them from fretting one another.

Mucila-
ginous
Glands
of the
Muscles.

Besides this Fat, which is contain'd in small Cells or Vesicles, are interspers'd among these *Fasciculi*, certain small *Glands*, which, as Dr. *Havers* has observ'd, afford a smooth mucilaginous Juice, which, together

gether with the Fat, contributes to lubricate these parts of the Muscles.

Besides the Muscles, subservient to the Motion of the Bones, are the *Mucilaginous Glands*, of which there are some in every Articulation. But those at the Articulations *per Enarthrosin* are considerable for their Magnitude, and lie at the bottom of the Concave Part of the *Acetabulum*. They are of the *Conglomerate* kind, and as those of the Muscles afford a Mucilage, which mixing with the Oil issuing from the Cavities of the Bones thro' the Perforations before mention'd, serves to lubricate, and render the Cartilages more slippery and easie of Motion as well as to keep them soft.

Mucila-
ginous
Glands of
the Joints.

Use.

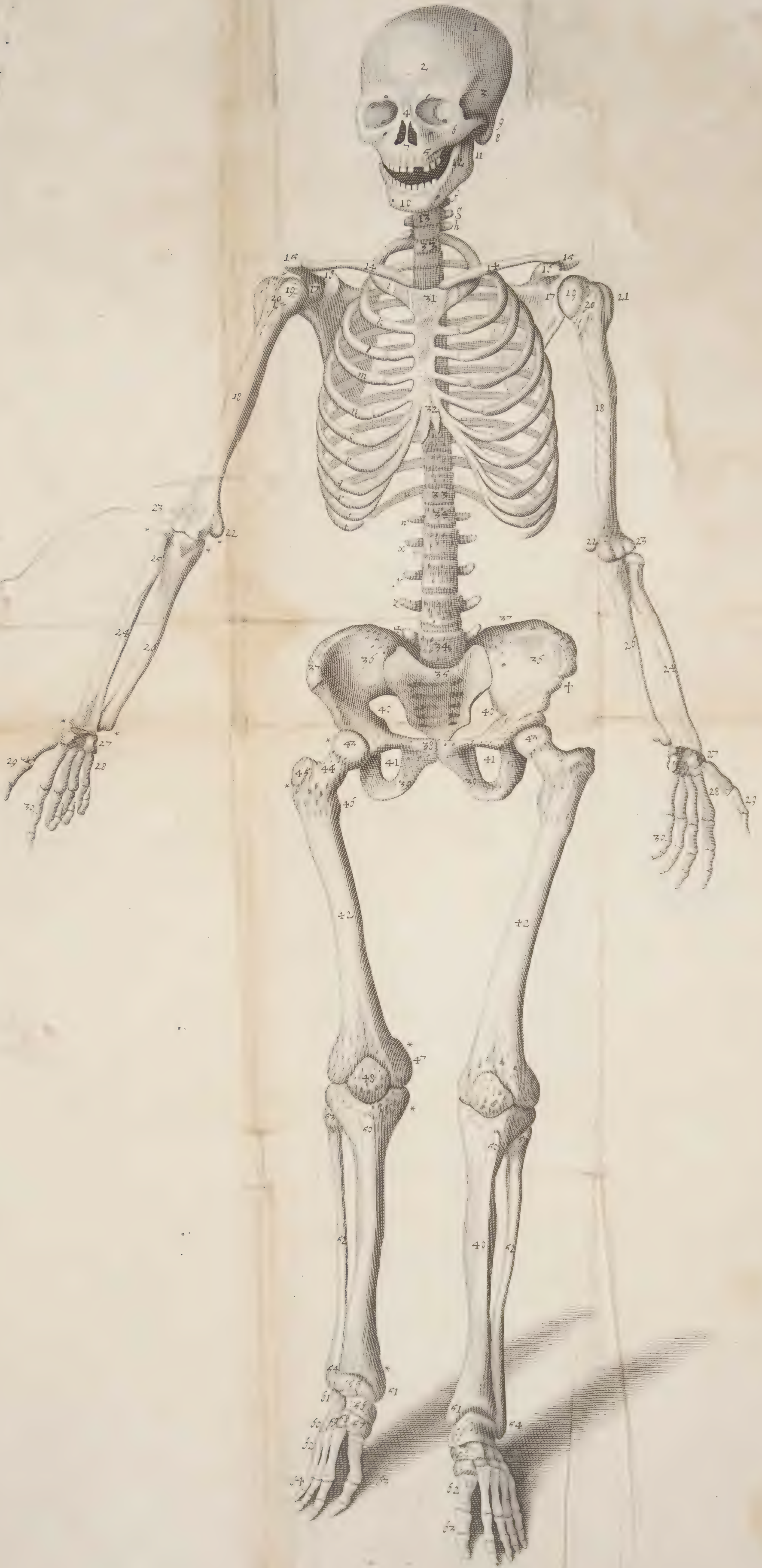
Besides these Parts instrumental to Motion, are the Ligaments, which have nothing peculiar beyond the Description already given, except their Originations and Insertions, which will be spoken of in their proper Places.

Ligament

T A B. XXI.

THE Fore-part of the *SCELETON* of a *MAN*.

- 1, The *Os Sincipitis* or *Bregma*.
- 2, The *Os Frontis*.
- 3, The *Os Temporum* or *Squamosum*.
- 4, The two Bones of the Nose.
- 5, The fourth Bone of the upper Jaw.
- 6, The first Bone of the upper Jaw, or Cheek-bone.
- 7, The *Septum Narium*.
- 8, The *Processus Mastoides* or *Mammiformis*.
- 9... The *Os Jugale*.
- 10, 11, 12, The lower Jaw-bone; 10, that part of it called the Chin; 11, its Posterior Process that is Articulated to the *Os Temporum*, called *Condylus*; 12, the Anterior Process called *Corone*.
- 13, The Bodies of the two Inferior *Vertebrae* of the Neck; *f g h*, their transverse Processes.
- 14, The *Clavicula*.
- 15, The *Spina Scapulae*.
- 16, The *Processus Coracoides Scapulae*.
- 17, The Short Process of the *Scapula*.
- 18, 19, 20, 21, 22, 23, The *Os Humeri*, or Shoulder Bone; 18, that Part of it where the *Deltoides* Muscle is Inserted; 19, Its Head that is Articulated with the Shoulder-blade; 20, the Asperity where the *Musculus subscapularis* is Inserted; 21, A *Sinus* in the Upper part of the Shoulder-bone that receives the External Tendinous Head of the *Musculus Biceps*; 22, The Internal Protuberance of the Lower part of the *Os Humeri*, whence the two Muscles, bending



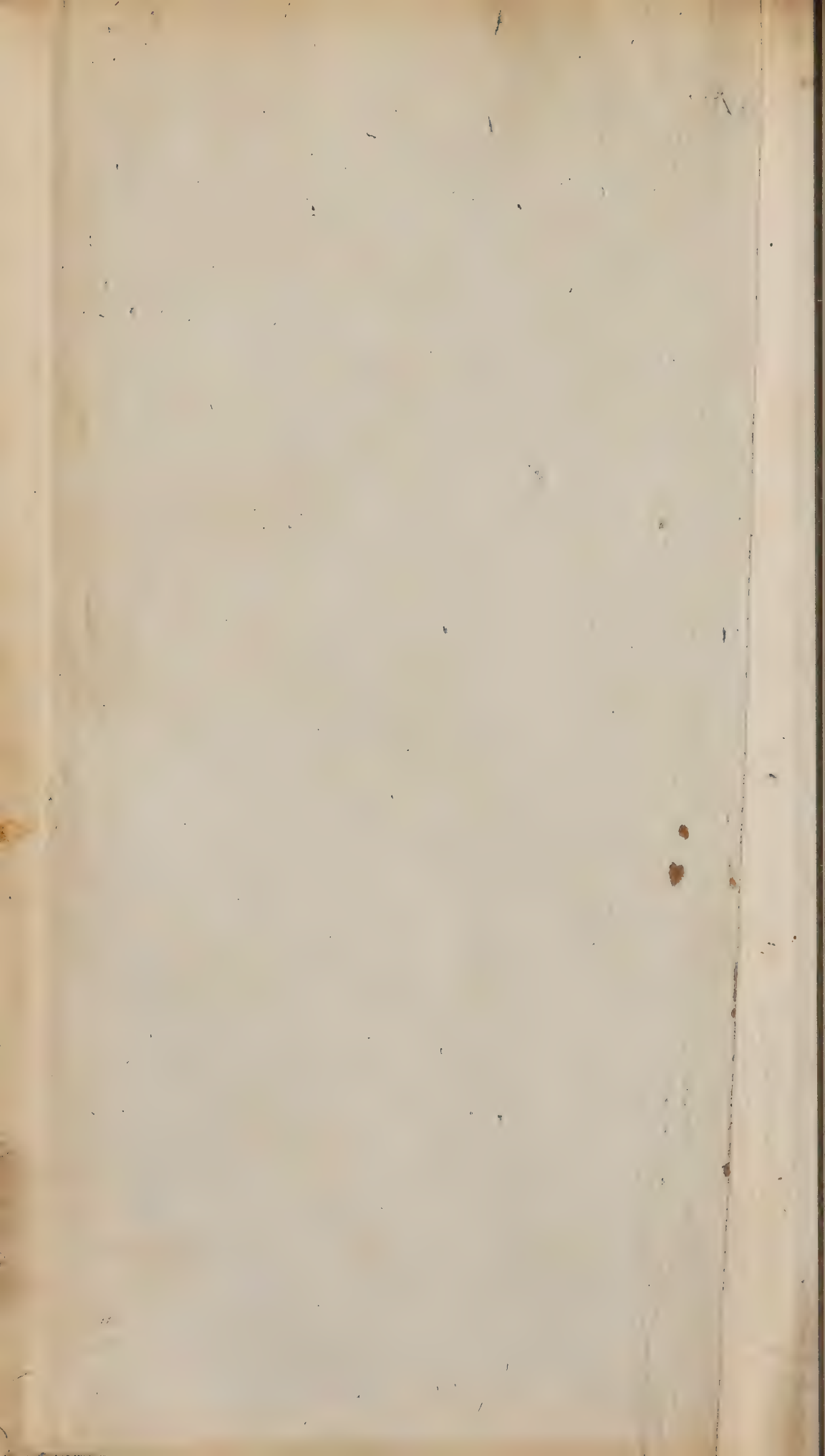
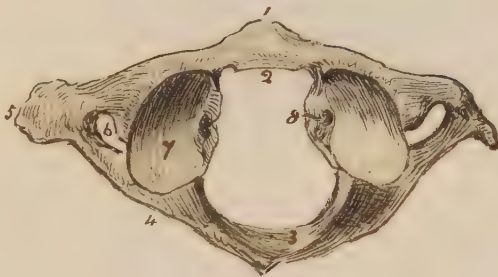


Fig. 1.



Fig. 2.



A central Cervical vertebra, seen upon its upper surface.
 body, concave in the middle, & rising on each side into a sharp
 2 The lamina. 3 The pedicle, rendered concave by the transverse
 vertebral notch. 4 The bifid spinous process. 5 The transverse
 process. 6 The vertebral foramen. 7 The superior
 articular process. 8 The inferior articular process.

The upper surface of the atlas. 1 The anterior tubercle
 rising from the anterior arch. 2 The articular surface for
 the dens upon the posterior surface of the anterior arch.
 posterior arch with its rudimentary spinous process. 4 The
 vertebral notch. 5 The transverse process. 6 The vertebral foramen.
 7 Superior articular surface. 8 The tubercle for the attachment
 of the transverse ligament.

Fig. 3.

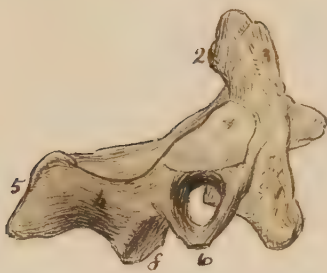
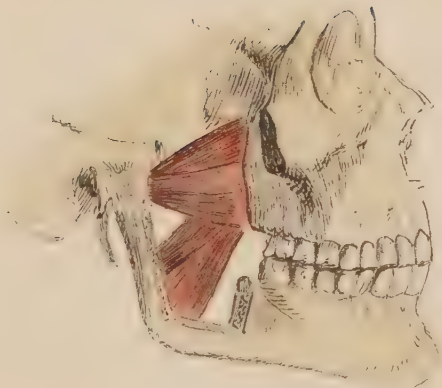


Fig. 4.



Fig. 3. A lateral view of the axis. 1. The body. 2. The Odontoid process. 3. The smooth facet on the anterior surface of the odontoid process to articulate with the anterior arch of the atlas. 4. The lamina. 5. The spinous process. 6. The transverse process pierced obliquely by the vertebral foramen. 7. The superior articular surface. 8. The inferior articular process.

Fig. 4. A lateral view of a dorsal vertebra. 1. The body. 2. 2. Articular facets for the heads of ribs. 3. The pedicle. 4. The superior intervertebral notch. 5. The inferior intervertebral notch. 6. The spinous process. 7. The extremity of the transverse process marked by an articular surface for the tubercle of a rib. 8. The two superior articular processes looking backwards. 9. The two inferior articular processes looking forwards.





bending, the *Carpus*, the *Pronator Radii Teres*, *Palmaris*, and *Musculus Perforatus* of the Fingers do arise ; 23, The External Protuberance of the last named Bone, whence the Muscles extending the *Carpus* and Fingers arise.

24, 25, The *Radius* ; 25, Its Prominence to which the large Tendon of the *Musculus Biceps* is Inserted.

26, The *Ulna*.

27, The eight Bones of the *Carpus*.

28, The four Bones of the *Metacarpus*.

29, The three Bones of the Thumb with their *Officula Sesamoidea*.


30, The Bones of the Fingers, compos'd of twelve Bones, of which, three belong to each Finger.

31, The upper Part of the *Os Pectoris* or *Sternum*.

32, The lower Part of the *Os Pectoris* or *Cartilago Ensiformis*, which is some times Bifid, as it appeared in the Subject from whence this Figure was Drawn.

33, 33, The *Vertebra* of the Back or *Thorax*.

34, 34, The *Vertebra* of the Loins. *i, k, l, m, n, o, p, q, r, s, t, u*, The twelve Ribs.

w, x, y, z, , The transverse Processes of the *Vertebra* of the Loins.

35, The *Os Sacrum*.

36, 37, 38, 39, The *Os Innominatum*, by some call'd *Coxendix* ; 36, 37, That part of it call'd *Ilium* ; 36, its Internal Concave Part, and 37, its *Spine* ; 38, the *Os Pubis* or *Pectinis*. 39, The *Ichi*, where it is joined to the last named Bone.

40, 40, The great Sinusicks of the *Ossa Ilium*, and circumscription of the *Pelvis Abdominis*.

41, The *Foramen* of the *Ischium* and *Os Pubis*.

42, 43, 44, 45, 46, 47, The *Os Femoris* or Thigh-Bone: 43, Its Head which is received into the *Acetabulum* or *Cotyle* of the *Os Innominatum*: 44, The neck of the Thigh-Bone: 45, The great *Trochanter*: 46, The lesser *Trochanter*, where the *Musculus Psoas* and *Iliacus Internus* are Inserted: 47, The lower and internal Head of the Thigh-Bone, to which the strong Tendon of the *Musculus Triceps* is Implanted.

48, The *Mola* or *Patella*, by some called *Rotula*.

49, 50, 51, The *Tibia*; 50, a Prominence on its upper Part, where the Tendons of all the Extending Muscles of the Leg are Inserted; 51, The *Malleolus Internus*.

52, 53, 54, The *Fibula*; 53 54, Its Superior and Inferior *Appendix*.

55, The *Astragalus*.

56, The *Os Cymbiforme*.

57, The *Os Cuneiforme majus, seu Internum*.

58, The *Os Cuneiforme medium*.

59, The *Os Cuneiforme Externum*.

60, The *Os Cubiforme*.

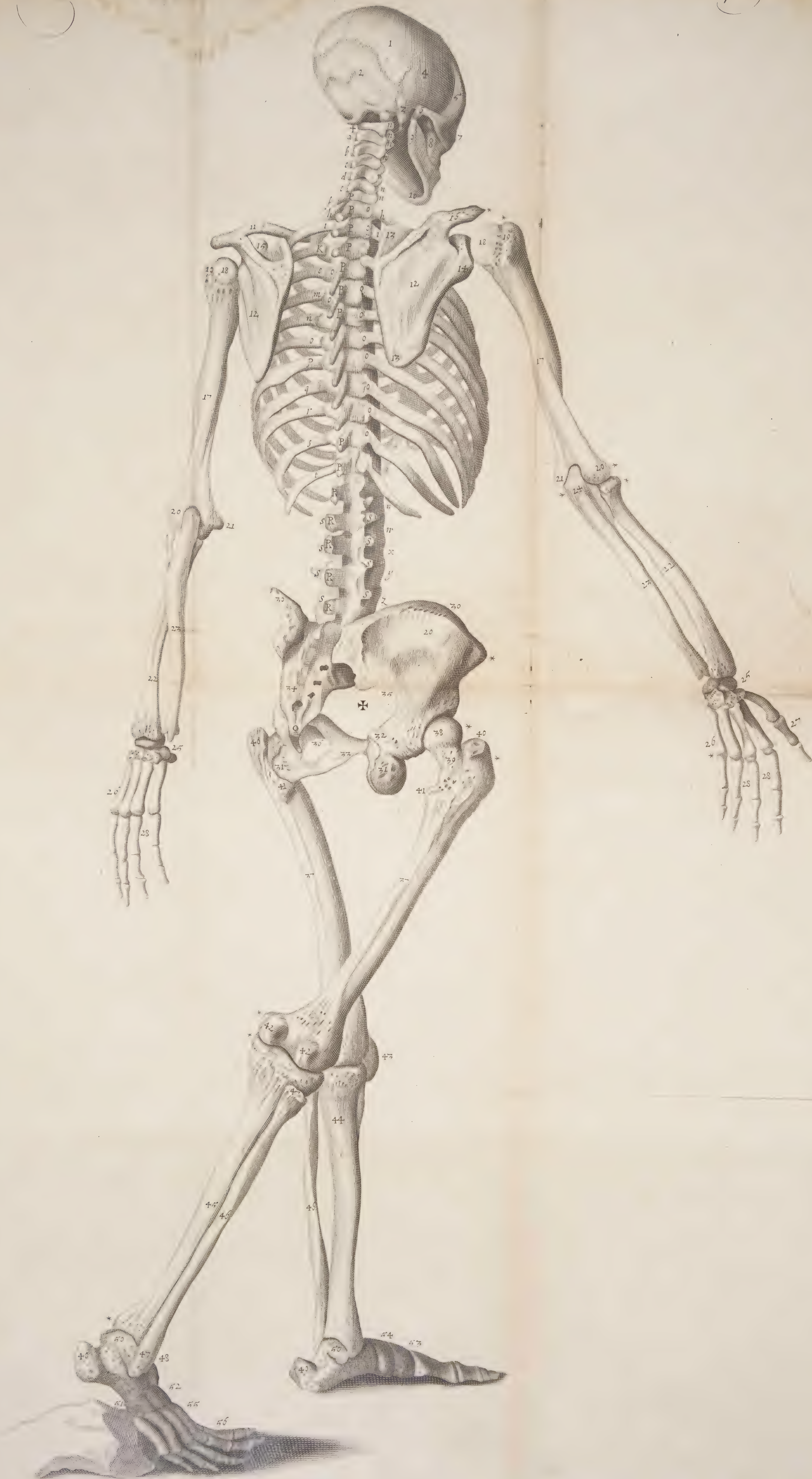
61, Part of the *Os Calcis in situ*.

62, The five Bones of the *Metatarsus*.

63, The two Bones of the great Toe.

64, The twelve Bones of the lesser Toes, of which three compose each Toe.

****, &c. The *Appendices* of the *Spina Scapulae, Os Humeri, Radius, Ulna, Os Femoris, and Tibia*.



T A B. XXII.

THE Back, and Side of the *SCELETON*
of a *WOMAN*.

- 1, The *Os Sincipitis*.
- 2, The *Os Occipitis*.
- 3, The *Processus Mammiformis*.
- 4, The *Os Squamosum*.
- 5, Part of the *Os Sphenoides*.
- 6, The *Os Jugale*.
- 7, The first Bone of the upper Jaw.
- 8, Part of the fourth Bone of the upper Jaw.
- 9, 10, The lower Jaw-bone; 10, The internal Part of it, where the *Musculorum par Geniohyoideum* and *Genioglossum* do arise.
- 11, Part of the *Clavicula*.
- 12, 13, 14, 15, 16, The *Scapula* or Shoulder-blade; 13, 13, Its *Basis*: From 13 to 14, Its *Costa Inferior*: 14, Its *Processus brevis*: 15, Part of the *Processus Coracoides* on the left side, *in situ*; 16, *Spina Scapula*.
- 17, 18, 19, 20, 21, The *Os Humeri*; 17, That part of it where the *Musculus Brachialis Externus* begins to arise; 18, The Head of the *Os Humeri*; 19, The Asperity of the *Humerus*, where the *Musculi Supraspinatus*, *Infraspinatus*, and *Teres Minor*, are inserted; 20, The External Protuberance, whence the extending Muscles of the *Carpus* and Fingers arise; 21, The Internal Protuberance of the *Os Humeri*, where the Muscles bending the *Carpus* and Fingers arise.
- 22, The *Radius*.

23, 24, The *Ulna*; 24, Its superior part called the *Olecranium* or the Elbow.

25, The eight Bones of the *Carpus*.

26, The four Bones of the *Metacarpus*.

27, The three Bones of the Thumb.

28, The Bones of the Fingers.

†, The first *Vertebra* of the Neck wanting a Spinal Process.

a, b, c, d, e, f, The Spinal Processes of the other six *Vertebra* of the Neck, of which the five Superior are double, between which are placed the *Musculi interspinales Colli*.

n, n, n, n, The transverse Processes of the *Vertebra* of the Neck.

b, i, k, l, m, n, o, p, q, r, s, t, The twelve Ribs.

ooo, &c. The transverse Processes of the *Vertebra* of the *Thorax*; *PPP, &c.* their Spines.

RRR, &c. The Spines of the five *Vertebra* of the Loins.

SSS, &c. The transverse Processes of those *Vertebra*.

u, w, x, y, z, The Bodies of those *Vertebra*.

29, The back part of the *Os Ilium*, by some called *Dorsum Ilium*.

30, The Spine of the *Ilium*.

31, The Protuberance of the *Os Ischium*, whence the Muscles bending, the Leg do arise, namely, the *Seminervosus*, *Semimembranosus*, and one of the Heads of the *Biceps*; together with the *Quadratus Femoris*, which latter is an Obturator.

32. An acute Process of the *Ischium*, between which and the last mentioned Protuberance 31, the Tendons of the *Musculus Marsupialis* pass, as on a Pulley.

33, The Internal of the *Os Pubis*.

34, The *Os Sacrum*.

o, The *Os Coccygis*,

✝ The distance between the *Os Sacrum Ilium* and *Pubis* is here remarkable, being much greater in *Women* than in *Men*.

35, The large *Sinus* of the *Os Ilium*, wherein the *Musculus Pyriformis* passes to its termination.

36, The great *Foramen* of the *Ischium*.

37, 38, 39, 40, 41, 42, The *Os Femoris*; 37, Its *Linea Aspera*; 38, Its Head that is received into the *Acetabulum* of the *Coxendix*; 39, The Neck of the Thigh-bone; 40, The *Trochanter major*, to which divers Muscles are inserted; 41, The lesser *Trochanter*; 42, 42, The two Inferior Protuberances of the lower *Appendix* of this Bone.

43, Part of the *Patella in situ*.

44, 45, The *Tibia*; 44, that part of the left, where the *Musculus Sartorius*, *Gracilis*, and *Seminervosus*, are inserted.

46, 47, 48, The *Fibula*; 47, 48, Its Superior and Inferior *Appendices*.

49, The *Os Calcis*.

50, The *Astragalus*.

51, The *Os Cuboides*.

52, The three *Ossa Cuneiformia*.

53, The *Os Cuneiforme majus*.

54, The *Os Cymbyforme*.

55, The *Ossa Metatarsi*.

56, The Bones of the Toes.

***, &c. The *Appendices* of the *Spina Scapulae*, *Os Humeri*, *Radius*, *Ulna*, *Ossa Metacarpi*, *Os Ilium*, *Femoris*, and *Tibia*.

C H A P. II.

Of the BONES and MUSCLES of the HEAD.

S Y L L A B U S

Spectabilium circa Capitis.

Ossa Propria	Frontis	{	Connexio	
			Sutura Sagittalis — in Junioribus	
			Tabulae	
			Sinus	
			Membrana Pituitaria	
			Foramina	
	Syncipitis seu Bregmatis	{	Processus	
			Musculi Frontales	
			Connexio	
			Figura	
	{	Suturae	Coronalis	
			Sagittalis	
			Lamdoïdalis	
			Squamosae	
	{	Sulci		
	{	Foramina		
Occipitis seu Prorae	{	Connexio		
		Figura		
		Sinus duo		
		Sulci		
		Foramina		
		Processus		
Temporalia	{	Suturae Squamosae		
	{	Ossa	Petrosa	
			Fugalia	
	{	Processus	Mammillares	
			Styloides	
{	Foramina	Communia		
{	Sinus	Propria		
Musculos	Par	{	Splenium	
			Complexum	
			Tertium Fallopium	
			Rectum	Majus Externum
				Minus Internum
			Rectum	Majus Internum
				Minus Externum
			Obliquum	Superius
				Inferius
			Mastoides	
			Rectum Laterale	

THE *Head* we divide into the *Skull* *Cranium*.
and *Jaws*.

The *Skull* consists of *eight* *Bones*; *six* Its Bones.
proper and *two* *common* to the *upper Jaw*,
which together, form that *Cavity* that
contains the *Brain*.

The first of the *Bones* proper to the
Skull is the *Bone* of the *Fore-head*, call'd Os Fron-
likewise *Coronale*, *Verecundum*, and *Os Pap-* tis.
pis: Its *Figure* is in a manner *circular*, and
in *Children*, is divided by a *Suture*, which
makes two of it, and is call'd the *Sutura Sa-* Sutura
gittalis, which, in *Adults*, generally grows Sagittalis.
up so as to leave no *Marks*, tho' sometimes
it happens otherwise.

It is join'd to the *Bones* of the *Syn Ciput* Conne-
by the *Coronal Suture*, which is of the *In-* xion.
dentate kind, and one of those which is
call'd the true *Suture*. Below to several
Bones of the *under Jaw* by the *Sutura*
Transversalis, and to the *Os Sphenoides* by
the *Sphenoidal Suture*.

It consists of two *Tables*, betwixt which, Tabulæ
just above each *Eye-brow*, are two *Cavities* Offis
or *Sinus*, which are lin'd on the outside Frontis
with a thick double *Membrane*, furnish'd Sinus duo
plentifully, with *Glands* and *Blood-Vessels*, Membra-
which separate part of that *Mucus* which na Pitu-
falls into the *Nose* into which they open. itaria.

It has three considerable *Perforations*, Foramina
one inwardly just above the *Septum* of the
Os

Os Cribrosum, which seems to communicate with the forementioned *Sinus* and the Nose; and two just above the upper part of the *Orbit* of the *Eye*, thro' which the Blood-Vessels pass, and a Branch of the fifth pair of Nerves.

Processus This Bone has four Processes; on each side two, at the corners of the Eyes, forming the upper *Orbit* of the *Eye*: Besides which, some reckon two other Prominences towards the *Temples*.

Frontales The Muscles which belong to this Part, are the *Frontales*; which spring from the upper part of this Bone, and serve to raise the Eyebrows, and corrugate the Skin of the Forehead.

Os Syn- But these have been already describ'd among the external Parts of the Face.
cipitis,
feu Breg-
matis.

The next are the two Bones of the *Syn-*
ciput, call'd likewise *Osse Parietalia*; which are of an irregular Square Figure. They are join'd to the *Os Frontis* by the *Coronal Suture*, to the *Occipital* Bone by the *Lambdoidal*, and to the Temporal by the *Sutura Squamosa*, which is of that kind which is not reckon'd *genuine*; and to each other by the *Sagittal Suture*: All which, except the *Squamosa*, are in new-born Children open, and close in Process of time. The inside of this Bone has several Furrows, made while it is tender by the impression of the Blood-Vessels, which run over the *Dura Mater*; which are deepest towards the

the *Temporal Bones*, and are in a manner obliterated upon the top of the Head.

They have each a small Perforation near the *Sagittal Suture*, thro' which the Blood-Vessels pass to the *Sinus Longitudinalis*. Foramina.

The Fourth is the *Os Occipitis* (which tho' the Bone of the hinder-part of the Head is improperly call'd *Os Proræ*, as that of the Forehead is *Os Puppis*) and is of a triangular Figure, and the thickest of the proper Bones of the Head. In new-born children it is divided into four, but grows up and becomes one in time. Os Occipitis, seu Proræ.
In Infants four.

It is join'd to the Bones of the *Sinciput* and the *Lambdoidal Suture*; as likewise to the *Petrosa*, and to the *Os Sphenoides*, at the *Sphenoidal Suture*. Connexion

Its Convex part is divided into two large *Sinus* for the reception of the *Hemispheres* of the *Cerebellum*: And two large *Sulci*, or *Furrows*, in which lie the *Sinus laterales*. Sinus duo
Sulci.

This Bone has seven *Perforations*; one which is very large, for the egress of the *Medulla Spinalis*; and has on each side it two little ones, thro' two of which enter the *Cervical Arteries*, and thro' the other two go out the *Nerves*, which serve for the Motion of the Tongue: The other two, which are common to this Bone and the *Os Petrosum*, on each side are the outlets of the *Sinus Laterales* and *Par Vagum*. Foramina.

On

Processus On each side of the great *Foramen*, is a *Process* lin'd with a *Cartilage*, which is articulated with the first *Vertebra* of the Neck, and generally a third about the middle of it; tho' this is sometimes wanting, and in the room of it only a Prominence of the Bone, which, or the *Process* where it is found, receives the Insertions of the *Muscles* of the Head, of which there are ten Pair.

Par Splenium. The first of these is the *Par Splenium*, so call'd, from the resemblance some have imagined it to bear to an *Ox's Spleen*. It arises partly tendinous, partly fleshy, from the Spines of the four *Superior Vertebrae* of the *Thorax*, and from the two lower of the Neck; the former part ascending obliquely, becomes again tendinous at the second, third and fourth *Transverse Processes* of the Neck, to each of which it has an Insertion: The latter likewise ascends obliquely outwards, and growing fleshy, is inserted into the Bone of the *Occiput*; part of it lying under the Insertion of the *Musculus Mastoideus*.

Common to the Head and Neck. This, tho' reckoned amongst the *Muscles proper* to the Head, is *common* to the Neck; the second or third *Vertebra* of which, they must certainly move in their Action; either of them moving separately, draw the Head and Neck obliquely backwards, together, they pull it directly back.

Action.

The

The next is the *Par Complexum*, which Par Complexum. arises with six thin small *Tendons* from the *Transverse Processes* of the *Vertebrae* of the Neck and *Thorax*, growing fleshy in its ascent, becomes again *Tendinous* about the middle, and then again becoming fleshy is inserted laterally into the upper part of the *Os Occipitis*, and the hinder part of the *Processus Mastoideus*. These, as the former, Action. acting together, pull the Head backwards, but either of them acting separately, draws it obliquely back.

Par Tertium Fallopii are not always found distinct, but being so in some Bodies it's sufficient only to take notice that they arise with five small flattish *Tendons* on each side from the first *Transverse Process* of the *Thorax*, and four inferior of the Neck, and becoming fleshy in their ascent, join in most Subjects with the upper part of the *Dorsi Longissimus*, and are inserted to the *Os Occipitis* near the *Mamillary Processes*.

The *Par Rectum Majus* arises Fleshy and Par Rectum, Majus Externum. *Tendinous* from the upper part of the double *Spines* of the second *Vertebra* of the Neck, and spreading in its ascent, is inserted into the posterior Part of the *Os Occipitis*. These Muscles draw the Head directly back upon the first *Vertebra*. Action.

The *Par Rectum Minus* are two small Par Rectum Minus Externum. Muscles, arising fleshy from the hinder part of the first *Vertebra* of the Neck, are inserted

serted into the middle of the *Os Occipitis*.
Action. These likewise draw directly backwards
 Par Obli- The *Par obliquum superius*, springs fleshy
 quum su- from the *Transverse Processes* of the second
 perius. *Vertebra* of the Neck, and ascending
 obliquely, is inserted laterally into the *Os*
Action. *Occipitis*. These move the Head back-
 wards upon the first *Vertebra*.

The *Obliquum Inferius* rises fleshy from
 the External Part of the *Spine* of the second
Vertebra of the Neck, near the Origination
 of the *Musculus Rectus Major*, and swell-
 ing into a fleshy *Belly*, runs obliquely to the
Transverse Process of the first *Vertebra*. This
 has not improperly been reckoned among
 the Muscles of the Neck: However, serving
 to turn the Head about, most Authors have
 given them a Place among the Muscles of
 the Head.
Action.

Par Mastoideum is so nam'd from its In-
 fertion into the *Processus Mastoides*. It has
 likewise another Insertion into the *Os Occi-*
pitis, which gives it a place here. It arises
 partly Tendinous, and partly Fleshy, from
 the upper part of the *Sternum*, and near
 half the *Clavicle*, with two (as it were dis-
 tinct) Originations, the first ascending
 somewhat obliquely outwards, joins with
 the second, and marching thence directly
 upwards, makes a round, thick, fleshy
 Body, thence passing over the upper part
 of the *Levator Scapulae*, it spreads again
 and

and is inserted into the *Processus Mammillaris* and *Os Occipitis* by the *Splenius*. These *Action.* Muscles are in a manner *Antagonists* to each other, and serve to draw the Head to either side, as the Acting Muscle is imploy'd.

The *Rectum internum majus* (not known by the Name of *majus*, till distinguish'd by Mr. *Comper*, upon the account of another Pair which he found reason to call *Rectum internum minus*) comes from the fore part of all the *Transverse Processes* of the *Vertebrae* of the Neck, except the first and second. In its Ascent it becomes fleshy, and running over the two upper *Vertebrae*, is inserted into the *Anterior Process* of the *Os Occipitis*, near the great *Foramen*. This *Action.* draws the Head forward, and is rightly call'd *Flexor Capitis*.

The *Rectum internum minus*, is a Pair of Muscles discover'd by Mr. *Comper*, arising from the fore-part of the first *Vertebra* of the Neck, and inserted into the fore-part of the *Os Occipitis*, immediately under the foregoing. This Pair is properly *Antagonists* to the *Rectum minus*, on the back-part of the Neck and Head, and serves to Nod the Head, or draw it forwards and downwards; and therefore these Muscles are properly enough named by Mr. *Comper*, *Annuentes*. *Action.*

The last Pair, which is inserted into the *Os Occipitis* is the *Rectum Laterale*; which *Rectum Laterale*
Tt is

is a short thick fleshy Muscle, rising from the superior part of the *Transverse Processes* of the first *Vertebra* of the Neck, between the last describ'd and the *Obliquum superius*; from whence it ascends to that part of the *Os Occipitis*, which is between the *Processus Mammillaris* and *Styloides*.

Action. These move the Head laterally towards either Shoulder; acting together, they are Antagonists to one another, and keep it steady.

Ossa Temporum.

Tab. xviii. Fig. I. D.

The two remaining proper Bones, are those of the *Temples*; which are of a Figure near circular. The fore and upper parts of them are very thin, consisting only of one *Table*; the lower and hinder parts are thick, hard and uneven. They are join'd to the *Os Syncipitis* by the *Sutura*

Hence Ossa Squamosum.

ra Squamosa, and on the lower part to the *Os Occipitis* and *Sphenoides*; to which latter, as likewise to the Bones of the upper Jaw, they are join'd by means of some *Processes*, in which part they are call'd *Ossa Petrosa*. Each of these Bones has two *Sinus*; the exterior of which is lin'd with a *Cartilage*, and receives the *Process* of the lower Jaw: The *Interior* receives the lower part of the *Sinus Laterales* of the *Dura Mater*.

Ossa Petrosa. Sinus.

Processus

Each of these Bones has four *Processes*; three *external*, and one *internal*.

The

The first uniting with a *Process* of a Bone of the *upper Jaw*, makes that bony Arch between the *Ear* and the *Eye*, which is called *Zygomaticum*, or *Jugale*; under which lies the Tendon of the *Musculus Crotaphytes*, where it joins with the *Masseter*. Os Jugale.
Tab. ib.

The second is a short, round, blunt *Process*, behind the *Meatus Auditorius*, called from its Figure *Mastoides*, or *Mammillaris*. Processus Mammillaris.
Tab. ib.

The third is a long, sharp, slender *Process*, named likewise from its Form *Styloides*. Some of these *Processes* have *Muscles* arising from, or inserted into them, which have been already described. Os Styloides.
Tab. ib.

The *Internal Process* is pretty long and large, containing the whole *Internal Meatus Auditorius*, and Cavity of the *Tympanum*, and is that Part which is peculiarly called the *Os Petrosum*; of whose *Sinus*, *Membranes*, and other Parts, we have already spoken at large. *Chap. 12. Book III.* Os Petrosum.

From this Bone, the *Crotaphytes*, or *Temporal Muscle* has in part its Original; but serving for the Motion of the lower Jaw, we shall refer it thither.

The *Temporal Bones* have seven *Perforations*; of which four are *proper*, and three *common*. These are likewise some of them *external*, and some *internal*. Of the first sort are the *Meatus Auditorius externus*, which is pretty large: The second is the Foramina.
Proper.

Meatus ad Palatum, from the Barrel of the Ear to the *Fauces*. This third admits a Branch of the *Carotid Artery* to enter the Skull. The fourth is the *Passage* for the *Auditory Nerve*. These four are *proper*; three *external*, and the last *internal*.

Common. The *common Perforations*, are, first a pretty large one between the *Process* of the *Os Petrosum* and *Os Occipitis*, thro' which passes the *Lateral Sinus* of the *Dura Meninx*. The second is near the same size between the extremity of the *Os Petrosum* and *Os Sphenoides*, which receives the *Carotid Artery*. The third, which is less, is situated at the side of the former, between the *Process* of the *Petrosum*, and the greater *Process* of the *Basilare*, or *Sphenoides*, thro' which passes a Branch of the Vein from the *Dura Mater* to the *Jugulars*.

*Bones
common.*

The two Bones common to the *Cranium* and *upper Jaw*, are the *Os Sphenoides*, or *Cuneiforme*, call'd also *Basilare*, and the *Ethmoides*, or *Cribriform*.

*Sphenoi-
des.*

Tab. 49.

Fig. 4. & 3.

The *Sphenoides* is situated at the bottom or *Basis* of the Skull, from whence, by a barbarous *Latin Term*, it has been called *Basilare*. It is commonly resembled to a Wedge, tho' the Imagination must be pretty assistant to make out the Similitude. It is joined to all the *proper Bones* of the Skull, tho' to the *Synsiphut* but by a

a very small *Superficies*. Its *Juncture* is called the *Sphenoidal Suture*. On the sides it is, as it were, continued to the *Os Petrosum per Symphysin*.

In *Infants* it consists of four Bones, which in *Adults* become one; which has several *Processes*, spread partly over the *Palate*, and partly over the sides of it. Two of these are broad and thin, like a *Bat's Wing*, and therefore called *Pterygoides*, and *Alæ Vespertilionum*: And at the lower end two others, incurvated like Hooks, upon which are turned the Tendons of the *Musculi Pterygostaphilini*: Besides which, is a little one on its outside, somewhat resembling the *Crista Galli*, situate in a small Cavity at the farther end of the *Vomer*. There are other called *Clinoides*, betwixt which is a *Sinus*, which is called *Sella Equina*, and *Turcica*, which contains the *Glandula Pituitaria*, a small Gland into which opens the *Infundibulum*.

Tab. xviii.
Fig. 1.
Pterygo-
ides.

Tab. XVII
Fig. 4.
Sella e-
quina.
Glandula
Pituita-
ria.

Forami-
na.

Proper.

This Bone has several *Perforations*; of which seven on each side are pretty conspicuous: Five proper to this Bone, and two common to the *Os Petrosum*; almost visible on the inside. The first Pair is in the fore-part of it, and affords a Passage for the *Optick Nerves*: The second are just behind the former, and in the form of a Slit; which convey the *Motorii Oculorum*, toge-

ther with a Branch of the Carotids to the Eyes, as likewise a Twig of the fifth Pair. The third Pair, which are small, round *Perforations*, make way likewise for Branches of the *fifth Pair* of the Nerves: As does likewise the fourth; which is placed a little lower and forwarder than the former, and is, as it were, a Continuation of the *Foramen lacerum*, and carries a part of the *fifth Pair* of Nerves, to the *Palate* and *Teeth* of the *upper Jaw*. The fifth is nearer the *Os Petrosum*, and conducts likewise a Branch of the fifth, with a Twig of the sixth to the *Tongue* and *lower Jaw*. Of the two *common Pair*, the greater gives entrance to the *Carotids*; the lesser lets out a Branch of the *internal Jugular*.

Common.

Ethmoides.

App. Tab.

49. Fig. 3.

The other *common Bone* is the *Ethmoides*, or *Cribrosum*; so called, because it is pierced with a great number of small Holes, like a *Cullender*. It is situated in the middle of the *Basis* of the *Forehead*, and gives passage to the Fibres of the *Olfactory Nerve*, which are hinder'd from pressing upon one another by a sharp *Apophysis* in the middle of this Bone, call'd *Crista Galli*. *Vid. Chap. 10. Book III.*

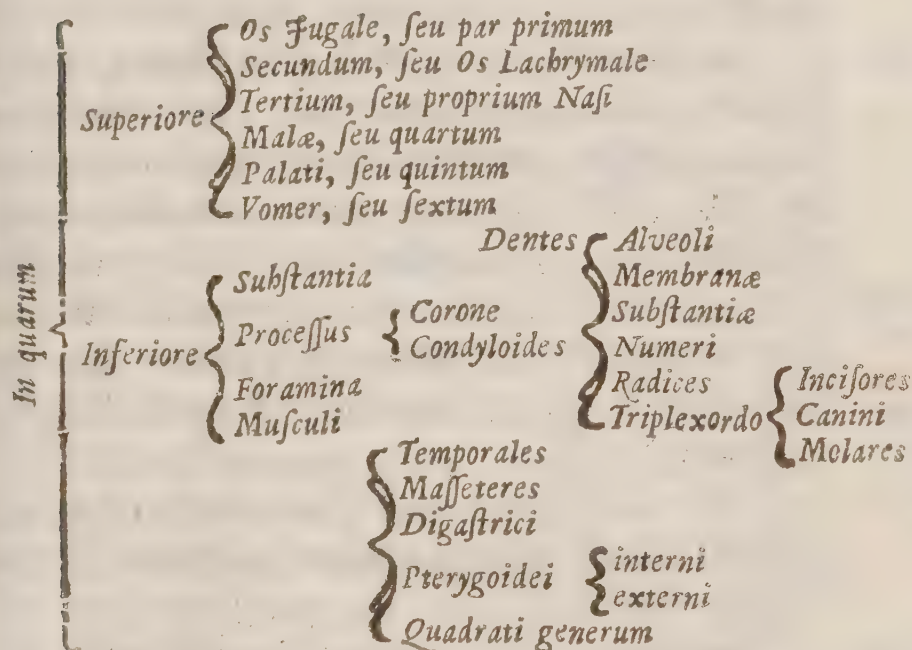
Crista Galli.

C H A P.

C H A P. III.

Of the BONES and MUSCLES of the JAWS.

S Y L L A B U S

Considerandorum in Maxillarum Ossibus & Musculis.

THE Jaws are constantly divided into the Upper and Under, from which most of the Muscles spring which make the external part of the Face.

Maxilla
superior.
Tab. xviii.
Fig. 1.
Os Jugal-
le.

The *upper Jaw* is immoveable, but with the whole Head, and consists of *eleven Bones proper*, join'd to each other *per Harmoniam*. The Bones of the *first Pair*, are of a Figure betwixt square and triangular, an irregular Square approaching to a Triangle. These make on each side part of the *lower Orbit* of the *Eye*, particularly, the *external Canthus*; and send out those Processes that make part of the *Os Jugale*, from whence some have called this Bone it self *Zygoma*.

Tab. ib.

The second is a small thin Bone, very brittle, and almost pellucid, and therefore seldom to be found in Skulls that have been buried. This makes the *inward Canthus* of the *Eye*, thro' which is a Passage to the Nose, called *Punctum Lacrymale*. Whether this properly belongs to the *Jaw* or not, we leave to those that love such Speculations.

Foramen
Lachry-
le.

Third
Pair.

The third Pair are likewise very thin, and are those which make the Bones of the Nose. P. 529.

Os Malæ.

The *fourth Pair* is the largest of the *upper Jaw*: They make a great part of the *lower Orbit* of the *Eye*, and of the *Palate*, and contain the *upper Teeth*; for the reception of which, there are Hollows or Sockets, answering in number to the Teeth. Its Cavity, called *Antrum Maxille superioris*, is mentioned in the Description

ption of the Cavities of the Nose, *Chap. 10.*
Book III.

The *fifth* Pair is situate at the bottom of *Fifth Pair.*
the *Palate*, where the great *Perforation* is
from the Nose. Upon these the *Palate* is
spread, and therefore they are properly
called *Bones of the Palate*. These are thin
Bones, but very hard and solid.

The *eleventh* and last Bone is the *Vomer*, *Vomer.*
or *Ploughshare*; which rising from the up-
per part of the inside of the *Palate*, di-
vides the Nose lengthways, and is there-
fore called the *Bridge of the Nose*: In
which, and the *Parietal* Bones of the Nose,
a *Caries* sometimes happens, which occasi-
ons that which we call the *Falling* of the
Nose; which sometimes likewise affecting
the Muscles that cover them, occasions the
loss of the Tip, or half the Nose.

Under the Bones of the *Palate*, run the *Musculi*
Musculi Pterygopalatini; which have been *Pterygo-*
already describ'd. *palatini.*

To the *upper Jaw* are fixt *sixteen* Teeth,
of which hereafter.

The *lower Jaw*, in *Children*, consists of *The lower*
two Bones, which in *Adults* unite so firm- *Jaw.*
ly together, as to seem but one. In Chil- *App. Tab.*
dren their Junctionure is *per Synchondrosin*, by *49. Fig. I.*
a Cartilage intermediate at the *Chin* and
fore-part of the *Jaw*; which Cartilage af-
terwards becoming *Osseous*, makes it a
Junctionure *per Symphysin Harmonicam* so close,
as

as if they were glu'd together, and so united, bear somewhat of the Figure of the Greek Letter *υ*.

Substance.

It is a thick, hard Bone, consisting of two *Tables*; betwixt is a spongy Substance which in Children is Medullous. The fore-part is shallow, just sufficient to afford Sockets for the Teeth; the hinder is deep,

Processes.

and has on each side two *Processes*, which are called *Cornua*, shooting upwards. The

Coronc.

foremost of which is called *Corone*, and receives the Tendon of the *Temporal* Muscle:

*Condyl-
oides.*

The hinder is nam'd *Condyloides*, and is guarded with a Cartilage. It is articula-

App. Tab.

49. Fig. I.

X. Y

ted with that part of the *Temporal* Bone, which is called *Petrosum*; upon which, as a Hinge, the *lower Jaw* moves, by the mediation of a moveable Cartilage, placed in this Articulation.

*Forami-
na.*

It has four *Perforations*, on each side two; one on the outside, which is the hinder and largest near the *Processes*, which receives a pretty large Branch of the fifth Pair of Nerves together with an Artery and Vein, which running the whole length of the Jaw, send a Twig to each *Tooth*. In the fore-part is another, by which the same Vessels come out again, and are dispers'd into the Lips, and its Muscles and Skin.

Teeth.

In this *Jaw*, as in the *upper*, are sixteen *Teeth*; which in either Jaw are fixt in peculiar *Sockets*, by that sort of Juncture

Alveoli.

which

which is called *Gomphosis*, by *Joyners* call'd *Pegging*, upon the account of the Gums, which serve to fix them in these Sockets: They may likewise be reckon'd to join, as *per Syssarcosin*. *How fast-
ned.*

This use of the Gums appears most plain in Morbid Cases, such as *Scorbutical*; in which when the Gums grow big and spongy, the *Teeth* are very apt to fall out: As they are likewise in artificial *Ptyalism*s; when, by the too great Flux of Humours thro' those Parts, their Substance is relaxt, and generally by the acrimony of the Humours or Medicines ulcerated: Perhaps in those Cases the extraordinary afflux of Humours may soften and dilate the Sockets. But upon what occasion soever it be, that the Gums either desert the Teeth, or become over-lax or spongy, the Teeth themselves are found to stand but very loosely, and subject to be turn'd out of their Sockets by any little Accident. *How loose-
ened.*

The Sockets, in which the Teeth are placed, are lined with a Membrane of exquisite Sense; which seems to be Nervous, and is wrapt about the Roots of each Tooth: From whence, and the Nerve, proceeds that Pain which is call'd the Tooth-ach, the Teeth themselves being altogether insensible. *Membrane*

The Teeth are the hardest and most polish'd Bones of the whole Body, without any *Substance.*

any *Periosteum* in the Prominent part; approaching in Consistence and Splendor to Ivory, which is the Tooth of an *Elephant*.

Number.

They are ordinarily sixteen in each Jaw; tho' the Number may be sometimes less in those that have lost none.

Sorts.

The Teeth are of three sorts: Those in the fore-part of each Jaw are called *Incisores*, and ordinarily four in number in each Jaw, which are broad, thin and sharp: Behind which, on each side of each Jaw, stand two, which are a little more prominent and pointed, and call'd *Canini*: Behind these are five in a row, on each side of each Jaw, which have a broad, flat Superficies, and are call'd *Molares*, or Grinders: These, in Men, are the Teeth of most Importance, as serving chiefly for Mastication; tho' other Carnivorous Animals, which live by Prey, and do not chew their Meat long, have more occasion for the *Canini* and *Incisores*.

Molares:
App. Tab.
49. Fig. 1.

Root.

The *Incisores* have generally but a single Root; the *Canini* sometimes a double one; the *Molares* being put to greater Stress and Service, have sometimes three, and sometimes four, especially the hinder; which being nearer the *Vice* or *Hinge* of the Jaw, are put to greater Service. These being in Men most employ'd, are the first generally that decay.

The

The Jaws are seldom fully furnish'd with them till about three Years of Age, tho' the time of their eruption be very uncertain and irregular. The first that appear are the *Incisores*; which begin to shew themselves frequently at seven or eight Months, and sometimes much earlier. Some indeed have been born with all their Teeth, which is look'd upon as a Monstrous Case.

Time of Breeding.

Incisores.

The *Canini*, which are by the Women call'd the Eye-Teeth, appear somewhat later. And last of all the *Molares*; which do not usually come all at a time, and often with such Difficulty and Pain, that if their eruption be not carefully watch'd and assisted, it costs the Infant's Life.

Canini.

Molares.

No Accident to which they are subject, costs the Life of more Children than *Dentition*; the Pain, and other Attendants of which, frequently throw them into *Epileptick Fits*, which sometimes carries them off almost in an instant. Dentition ought therefore to be carefully watch'd, and not trusted to the sole Security of whetting the Gums with a bit of *Coral*, or foolish, superstitious Amulets, such as *Pæony*-Roots, or the like: But whenever the Gum appears to be swell'd and painful, the eruption of the Tooth should be facilitated by opening of it with a *Lancet*, or some more proper Instrument, such as is now in use for

Danger in Dentition.

for that purpose: In the use of which, care should be taken to reach the Tooth itself, that the Membrane immediately covering it (from which the Pain principally arises) may certainly be divided, and the Gum not superficially only wounded, as it generally is, when Old Women undertake this *Operation* with their *Harry Groats*. This alone is not sufficient in difficult Dentition, which is usually attended with a *Fever* and a *Superfluity* of *Humour*, and frequently a *Diarrhæa*: But the Direction in such Cases belongs to Practice, and must be left to skilful Physicians; who will know whether *Evacuation* by Stool (as it often is) be necessary, or any other Method.

Change.

Ordinarily at the Age of seven, eight or nine Years, the first set of Teeth are thrust out by a Race of *Successors*, which (the way being already made for them) come out easier: Tho' sometimes, when they come at an Age more advanced (as they will now and then) they do it with Pain and Difficulty; because the Head of the Tooth being broader than the Roots of that which stands over it, the Membrane, which was conform'd to the Figure of the former, is extraordinarily distended, which always produces Pain.

Decay.

The time of their Decay is uncertain; but generally in Age they fall out, either
by

by their own Corruption (which they are very liable to, as appears by their frequent growing hollow) or by the Defects of the Gums, or their Sockets: Diseases and other Accidents often pull them out in younger Heads, especially *Mercurial Salivations*.

The Vessels which go to and from the *Vessels* Teeth, are Nerves from the fifth Pair, Arteries from the *Carotids*, and Veins, which go to the external Jugular; all which run along the Hollow of the *Maxilla inferior*.

To this *lower Jaw*, which only is move- *Muscles* able (the *upper Jaw* having none but what *of the lower* is common to the whole Head) belong *er Jaw* five pair of *Muscles*.

The first of which is the *Crotaphytes*, *Crota-* or *Temporal*. Its Fibres spring severally *phytes* from the Bones of the Forehead, the *Tab. 23.* *Sinciput*, the *Sphenoides* and *Temporal*; *& 24.* which meeting, and as it were centring under the *Os Jugale*, from whence also this Muscle receives some Fibres, they proceed to the *Processus Corone*, into which they are inserted, and draw the lower *Action.* Jaw upwards.

The *Masseter* is partly continued *Masseter.* from the former, and springs fleshy and *Tab. ib.* tendinous, from the first Bone of the upper Jaw, and backwards from the *Os Jugale*: Its Fibres decussating each other

ther in acute Angles, descend to the inferior edge of the outside of the lower Jaw, and assist the former in drawing up the Jaw.

Biventer or, Digastricus. The next is the *Digastric*, so called, from its having two *Venters*, or *Bellies*. *App. Tab. 39. Fig. 4.* It rises fleshy from a Furrow at the side of the *Processus Mastoïdes*, whence, in its Descent through the *Stylohyoideus*, and an annular Ligament of the *Os Hyoides*, it becomes tendinous. From this Bone, arise some Fibres which joyn its second Belly, where it grows again fleshy, and returning upwards, is inserted into the middle of the inferior part of the lower Jaw.

Action. By this Contrivance, its middle Tendon, which passes through the circular Ligament of the *Os Hyoides*, is seated lower than either its Origination or Insertion, and by that means it is enabled to draw the Jaw downwards, which otherwise it had been impossible for it to have done.

Pterygoideus internus. The *Pterygoideus internus* arises partly fleshy, partly tendinous, from the *Processus Pterygoïdes* of the *Os Sphenoides*, and is inserted at the bottom of the lower Jaw, on its inside opposite to the *Masseter*. These

Action. Muscles acting severally, draw the Jaw to one side; but together they assist the *Masseter* and *Crotaphytes* in the Action of Mastication.

The

The *Pterygoideus externus* arises from the external part of the same *Processus Pterygoi-*
des, and from the superior part of the *Os*
Sphenoides, near its Commissure, with the
 Bone of the Temple, and running back-
 wards, is inserted into the *Processus Condyl-*
loides, of the lower Jaw. This Muscle
 draws the Jaw forward, and makes the
 lower Jaw shoot beyond the upper.

Pterygo-
ideus ex-
ternus.

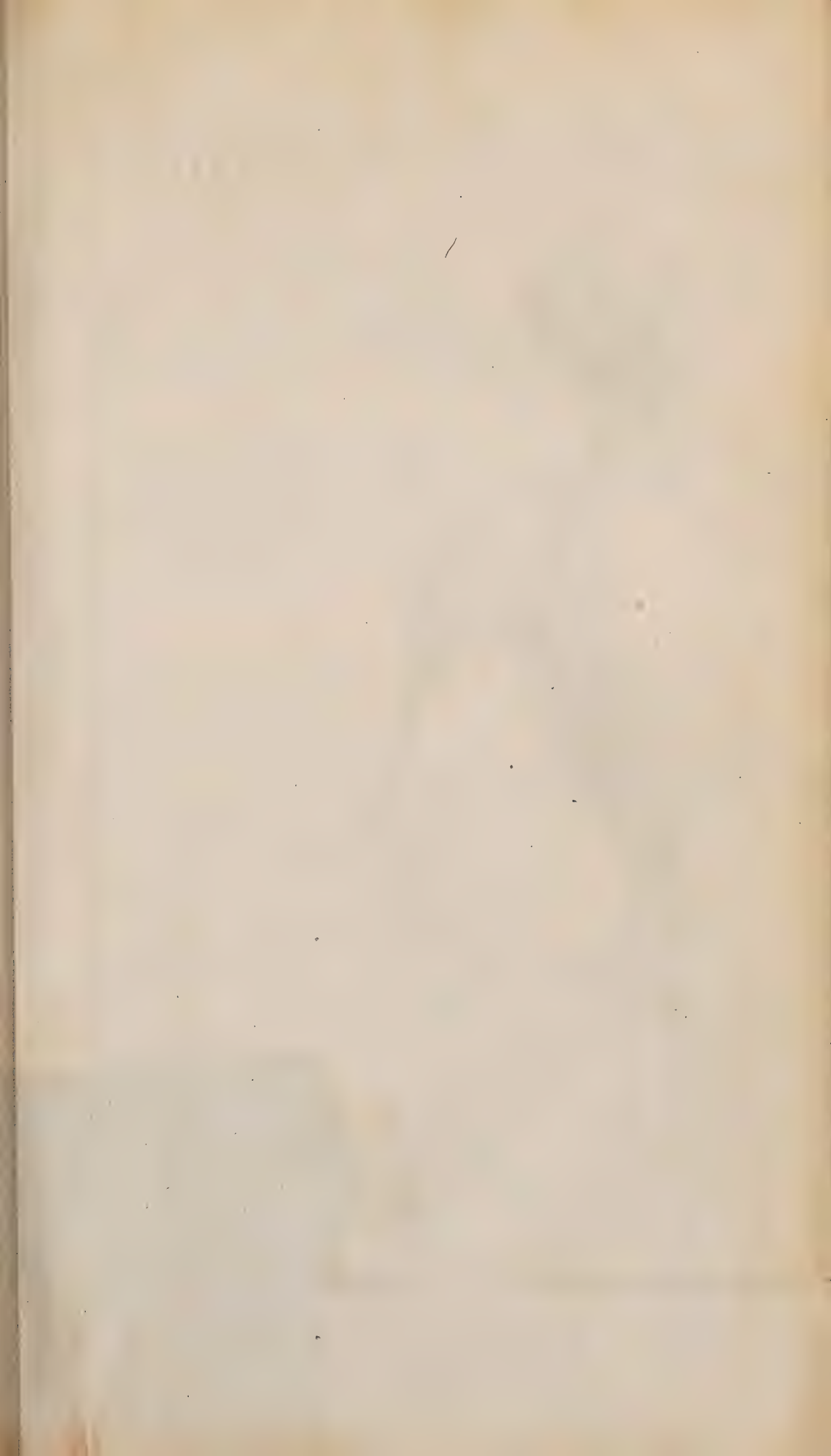
Action.

Besides these, which are proper to the
 lower Jaw, the *Quadratus Genæ*, which
 is a broad, square Muscle, lying under the
 Skin of the Neck, arises thin and membra-
 nous from the Spines of the *Vertebrae* of
 the Neck, and from the Skin of the supe-
 rior part of the *Cucullaris*, and Pectoral
 Muscle: From whence ascending under
 the Skin of the Neck, it becomes fleshy,
 and is inserted partly into the *Os Hyoides*,
 and partly into the middle of the under
 ledge of the lower Jaw, and has been al-
 ready describ'd under the Name of the
Subcutaneus. Book III. Chap. 13.

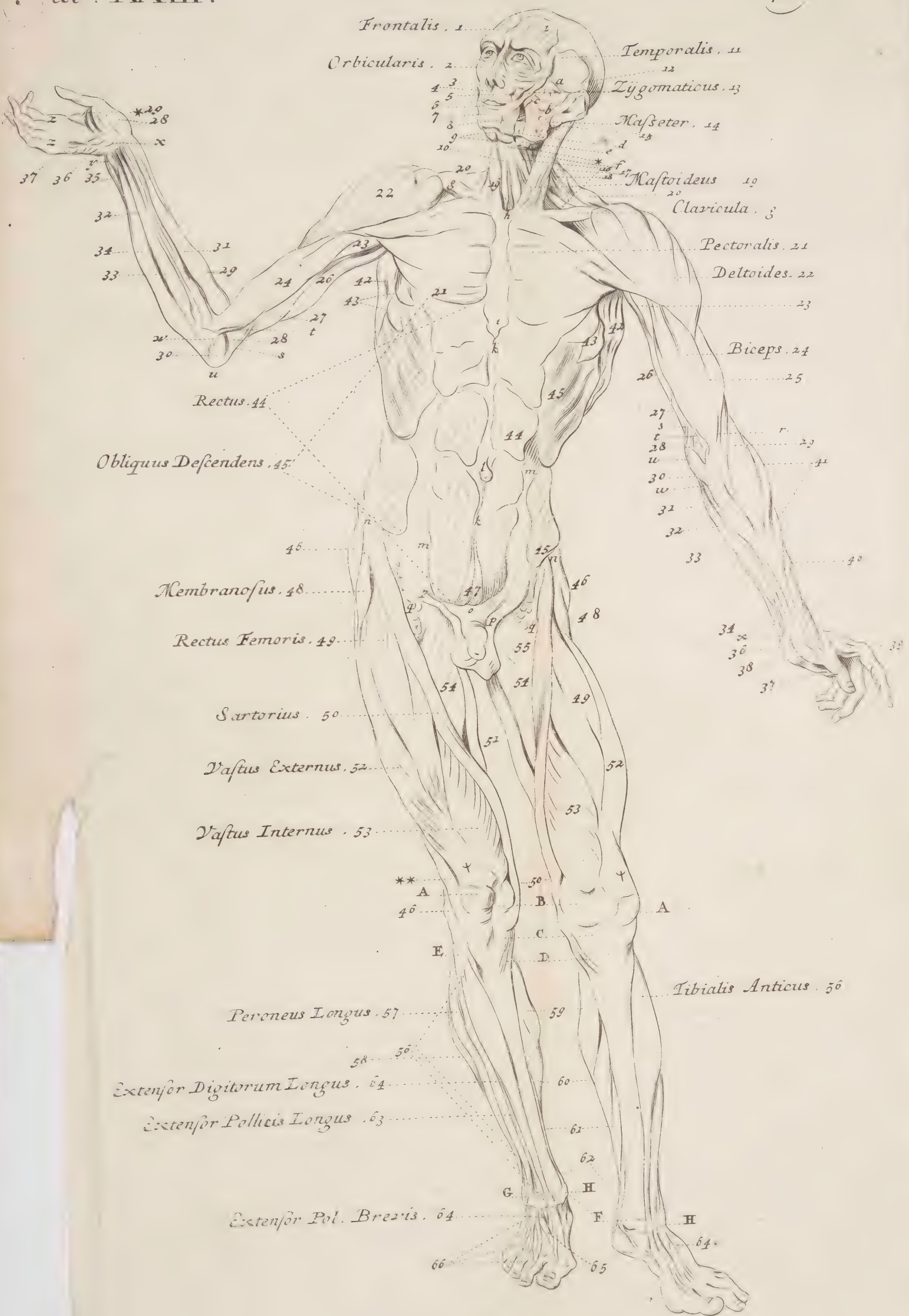
Quadra-
tus genæ.

T A B. XXIII.

1. **T**HE *Musculus Frontalis*.
2. The *Orbicularis Palpebrarum*.
3. The *Elevator Labii superioris*, and *Dilatator Ala Nasi*.
4. The *Elevator Labii superioris proprius*.
5. The *Elevator Labiorum*.
6. The *Orbicularis*, seu *Sphincter Labiorum*.
7. *Depressor Labii inferioris proprius*.
8. *Depressor Labiorum communis*.
9. The two extremities of the *Digastrici*, near their Insertions to the lower *Mandible*.
10. The *Sternohyoideus*.
11. The *Temporalis*.
12. The *Elevator Auriculæ*.
13. The *Zygomaticus*.
14. The *Masseter*.
15. Part of the *Buccinator*.
16. The *Coracohyoideus*.
17. Part of the *Elevator Scapulae*.
18. Part of the *Scaleni*.
19. The *Mastoideus*.
- a, The *Os Jugale*.
- b, The *Parotid Gland*.
- c, Its *Salival Duct*.
- d, The lower *Jaw-bone* bared.
- e, The inferior *Maxillar Gland*.
- * Part of the *Os Hyoides*.
- f, A considerable Branch of the *Carotid Artery*, *vid. App. Tab. XXXIX. Fig. 4.* not letter'd.
- g, The *Clavicula*.
- h, The upper part of the *Os Pectoris*, or *Sternum*, where the *Claviculae* are articulated.
- i, The







Frontalis . 1

Orbicularis . 2

Temporalis . 11

Zygomaticus . 13

Masseter . 14

Mastoideus . 19

Clavicula . 3

Pectoralis . 21

Deltoides . 22

Biceps . 24

Rectus . 44

Obliquus Descendens . 45

Membranofus . 48

Rectus Femoris . 49

Sartorius . 50

Vastus Externus . 52

Vastus Internus . 53

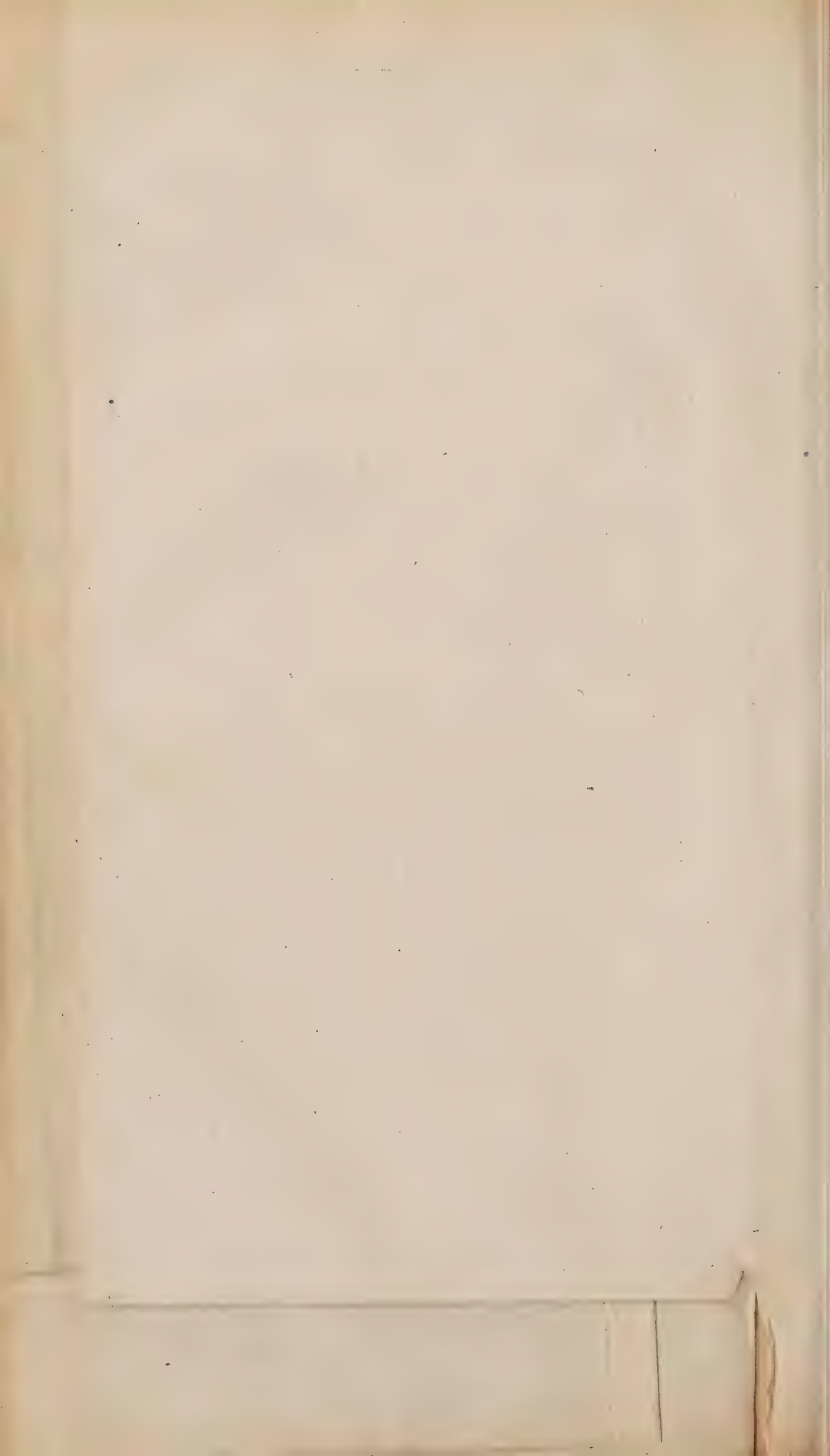
Peroneus Longus . 57

Extensor Digitorum Longus . 64

Extensor Pollicis Longus . 63

Extensor Pol. Brevis . 64

Tibialis Anticus . 56



i, The *Cartilago Ensiformis* at the lower part of the *Sternum*.

kk, The *Linea Alba*.

l, The *Navel*.

m, The *Linea semilunaris*, or meeting of the Tendons of the two *Oblique Muscles*, before they pass over the *Rectus*.

n, The *Spine* of the *Os Ilium*.

o, The *Os Pubis*.

p, The Process of the *Peritoneum*, inclosing the *Spermatick Vessels*.

q, The *Glandula Inguinalis*.

r, The Trunk of a *Nerve*, marching by the *Musculus Biceps*, which I have known wounded by an ignorant Blood-letter, in opening the middle *Vein* of the Arm.

s, The Trunk of a *Nerve* passing immediately behind the *internal Protuberance* of the *Os Humeri*, by pressing of which a great Pain is caus'd

t, The Trunk of the *Axillary Artery*, descending under the *Fascia Tendinosa*, to the *Cubit*, where it is sometimes wounded by bold Blood-letters.

u, The *internal Protuberance* of the *Os Humeri*.

w, The *Fascea Tendinosa*.

x, The *Ligamentum Annulare* of the *Carpus*.

y, The extremity of the *Ulna* next the *Carpus*

zz, The *Tendinous Expansion* of the *Palmaris* in the *Palm*.

ΨΨ, The *Tendon* of all the *extending Muscles* of the *Tibia*, above the *Patella*.

A, The *Patella*.

***, The *Tendon* of the *Musculus communis Membranosus*, near its implantation to the *Fibula*.

B, The *internal lower Protuberances* of the *Thigh-bones*.

C, The *superior Appendages* of the *Tibia*.

D, The *Terminations* of the *Tendons* of *Sartorius gracilis*, and *Seminervosus*.

E, The *upper Appendix* of the *Fibula*.

F, The *Malleoli interni*, or *lower Appendages* of the *Tibia*.

G, The *Malleolus externus*, or *lower Appendix* of the *Fibula*.

H, The *Ligamentum transversale pedis*.

N. B. If any of the same Parts are referr'd to by the like Characters in any of the succeeding Figures, let these be their Explication.

20 Part of the *Cucullaris*.

21 The *Pectoralis*.

22 The *Deltoides*.

23 Part of the *Coracobrachialis*.

24 The *Biceps*.

25 The *Brachialis externus* in the left Arm.

26 Part of the *Gemellus*.

27 The *Brachialis internus*.

28 The *Brachialis externus* in the right Arm.

29 The *Supinator Radii longus*.

30 The *Pronator Radii Teres*.

31 *Flexor Carpi Radialis*.

32 *Palmaris longus*.

33 *Flexor secundi internodii Digitorum perforatus*

34 *Flexor Carpi Ulnaris*.

35 Part of the *Extensor Carpi Ulnaris*, in the right Arm.

36 *Palmaris brevis*.

37 *Abductor minimi Digiti*.

38 *Abductor pollicis*.

39 *Abductor indicis*.

* 29 *Flexor secundi Ossis pollicis*.

40 *Extensores pollicis* of the left Arm, partly in sight.

41 Parts of the *Radialis Extensor* of the same Arm.

42 Part

- 42 Part of the *Latissimus Dorsi*.
- 43 The *Serratus major Anticus*.
- 44 The *Rectus Abdominis*, under the two
Tendons of the *Oblique Muscles*.
- 45 45 The *Obliquus descendens*.
- 46 Part of the *Gluteus medius*, cover'd with
the Tendon of *Gluteus magnus*.
- 47 The *Pyramidales*.
- 48 The *Membranofus*.
- 49 The *Rectus Femoris*.
- 50 The *Sartorius*.
- 51 Part of the *Gracilis* in each Thigh.
- 52 The *Vastus externus*.
- 53 The *Vastus internus*.
- 54 The first describ'd Head of the *Triceps*.
- 55 The Second.
- 56 The *Tibialis Anticus*.
- 57 The *Peroneus primus*.
- 58 Part of the *Gastrocnemius internus*, or
Soleus.
- 59 Parts of the *Gastrocnemii externi*.
- 60 Parts of the *Solei* on the inside of the Legs.
- 61 Parts of the *Flexores Digitorum perforantes*.
- 62 Part of the *Tibialis posticus* appears near
the *Malleolus internus*.
- 63 The *Extensor pollicis pedis longus*.
- 64 *Extensor Digitorum longus*.
- 65 The *Extensor pollicis brevis*.
- 66 The *Extensor Digitorum brevis*.

C H A P. IV.

Of the BONES and MUSCLES of the NECK.

S Y L L A B U S

Conspiciendorum in Colli.

Ossibus & Musculis	Vertebrae	Substantia	Colli
		Processus	
		Articulatio	
		Atlas	
		Epistrophus	
		Axis	
		Foramina	
Musculi	Musculi	Longi	
		Spinales	
		Transversales	
		Interspinales	
		Intertransversales	

Vertebrae.

THE Bones of the Neck are call'd *Vertebrae*, and are in that part ordinarily Seven only in Number; tho' Authors say, that some Long-neck'd Persons have had Eight.

Substance.

Each *Vertebra* consists of a *Body*, the Substance of which is spongy, or cavernous, having in the middle a large Perforation, thro' which the *Medulla Spinalis* passes, and

Apophyses.

seven *Apophyses*, or *Processes*. The fore-part of the *Body* is round, or convex: the hinder, from which spring the *Processes*, somewhat depress'd or flattish. Their upper

per and lower Sides, by which they are connected to one another, are plain, and cover'd with a Cartilage. They are join'd to one another by a *loose* Articulation, with a manifest Motion, with an intermediate *Cartilage* on the Surface of each Bone: And receive one another, the Head of the lower entering a small Concavity in the lower part of the upper; except the first and second of them.

Diarthrois.

Synchondrosis.

Ginglymus.

They have all Eight Processes, except the first, which have but six; two *superior*, two *inferior*, two *transverse*, and two *posterior*, which are peculiarly nam'd the *Spines*; from which the whole *Series* of Bones, from the Head to the end of the *Os Sacrum*, consisting in all of thirty Bones (whereof twenty four only belonging to the Neck, Back, and Loins, are strictly to be call'd *Vertebrae*) is nam'd the *Spine*. The posterior Process is wanting in the first *Vertebra* of the Neck.

Processes.

Spine.

The first *Vertebra* is call'd *Atlas*; because it sustains and supports the Head, to which it is join'd by its ascending *Oblique Processes*, which receive the Tubercle of the *Occiput*.

Atlas.

App. Tab.

49. Fig. 6.

The second is call'd *Epistrophus*; from the middle of which arises a Process resembling a Tooth, and therefore call'd *Dens*; which is inserted into a *Sinus*, fenced with a Ligament within the great Per-

Epistrophus.

ib. Fig. 7.

foration of the first *Vertebra*: Upon this the Head turns as upon an *Axis*. The Superfice of this Process is a little rough, upon the account of a Ligament, which rises from thence and ties it to the *Occiput*. It is likewise surrounded by another Ligament, which keeps it from slipping out of its *Sinus*, or Socket, and compressing the Spinal Marrow, which would be a fatal Accident.

Axis.

The third *Vertebra* of the Neck is call'd the *Axis*; a Name better suiting the Office of the former. The rest of the *Vertebrae* have no peculiar Names.

Foramina.

All the transverse *Processes* are perforated (which is peculiar to those of the Neck) for the Passages of the *Cervical Arteries* and *Veins*, which pass to and from the Brain. The Spines of the six lower are forked, and have small Muscles between them call'd *Inter-spinales Colli*.

Longus Colli.

App. Tab.

40. Fig. 3.

The first of the Muscles of the Neck is the *Longus Colli*; which arises mainly fleshy, tho' tendinous in a small part of its Origin, from the fore-part of the five upper *Vertebrae* of the *Thorax*, and is inserted into the fore-part of every *Vertebra* of the Neck.

Action.

It shews plainly its Action to be to bend it forward. This, as most other Muscles of the Neck, secondarily affect the Head in its Motion, as it stands and turns upon the Neck, and so is with them sometimes reckon-

reckon'd amongst the Muscles common to the Head. Scaleni.
Ibid.

The *Scaleni* are likewise by some accounted Muscles of the Neck; but serving rather for the Motion of the Ribs, they shall have a place amongst those Muscles, as *Fallopins* has put them.

The *Spinalis Colli* springs from the five superior *Transverse Processes* of the *Thorax*, and inferior of the Neck. It creeps along the Spine, from which course it is called *Spinalis*, and becomes at last pretty full and fleshy, at its Insertion on the inferior Part of the second *Vertebra* of the Neck laterally. This draws the Neck backwards. Musculus
Spinalis
Colli.
Tab. ib.
Fig. 2.

Action.

Under this lies the *Transversalis Colli*; which arises fleshy from the *Transverse Processes* of the upper *Vertebra* of the *Thorax*, and is inserted by a several Tendon, into every *Transverse Process* of the Neck, which it turns laterally backwards, serving to look over the Shoulder. Trans-
versalis
Colli.
Ibid.

Action.

Besides these, Proper to the Neck are five Pair of small Muscles; discovered by Mr. *Comper*, and by him, from their Position, call'd *Musculi Interspinales*. They arise from each double *Process* of the *Spine* of the Neck, and run from the upper, to the next below; into which they are inserted. These serve to approximate and draw together the *Vertebrae* of the Neck, Interspina-
les
Colli.

Action.
and

and are more especially proper to this Part, as having both Origin and Insertion in it.

Besides these, he has since observ'd others of the same Size and Figure, between the Transverse Processes of the *Vertebrae* of the Neck; which he calls *Intertransversales Colli*. *Vid. Phil. Transact.* Vol. 21. p. 132.

C H A P.

C H A P. V.

Of the BONES of the BACK, and other parts
of the THORAX, and their MUSCLES.

SYLLABUS

Eorum quæ consideranda veniunt in Dorsi &
Thoracis.

Ossibus	{	Vertebra	}	Sinus
		Sternum		
		Cartilago Zyphoides		
		Scrobiculus Cordis	}	Figura
		Costa { verae { spuriae		
Musculis	{	Communes	Subclavii	
			Serrati Majores Antici	
			Serrati Minores Antici	
			Scaleni	
			Sacrolumbales	
		Proprii	Cervicales descendentes	
			Serrati superiores postici	
			Serrati postici inferiores	
			Intercostales	
			Triangulares	
			Diaphragma	

THE *Vertebrae* of the Back are in ^{Verte-}
Number twelve, and have the same ^{bræ.}
Figure, Processes, Articulations, Cartilages,
Perforations, for the *Medulla Spinalis*, with
the five lower of the Neck; except that
the

the Body of the *Vertebra* is here somewhat larger, and the *Transverse Processes* not perforated, as they are in the Neck, for the Passage of the *Cervical Arteries*; and have on each side of the Body of the *Vertebra*, a small Impression or *Sinus*, for the reception of the round Head of each Rib: And in the transverse *Process* another very small one, which receives the Prominence of the Rib near that Extremity.

Sinus.

Sternum. The fore-part of the *Thorax*, call'd the *Sternum*, is cover'd with a broad spongy Bone, partly Cartilaginous; which for the first seven or eight Years of our Lives, do remain such, and consists of eight several Bones, or rather Cartilages, which slowly and in length of time become Osseous, and unite, and seldom have, in *Adults*, above three distinguishable Bones.

Sinus.

The uppermost of these is the largest and thickest, especially in its upper Part; and has on each side two *Sinus*, one for the Head of the *Clavicle* (of which more afterwards in its proper place) and another somewhat lower, for the *Cartilaginous* end of the *first Rib*.

Sinus.

The second, which is longer than the former, is likewise thinner, and has on each side four or five *Sinus*, for the Reception of so many of the Ribs.

The third and last is the least of them, and receiving into its *Sinus*, on each side

one,

one or two of the *true Ribs*, grows narrow afterwards, and end in a Cartilaginous point, which is call'd the *Cartilago Zyphoides*, or *Ensiformis*, from its Figure, ^{Zyphoides.} which is imagined to resemble the Point of a Sword. This Point is sometimes forked, and then it is call'd *Furcilla*. ^{Furcilla.}

On the outside of the *Sternum* is a pretty large Depression, or sinking in about the middle, which is call'd *Scrobiculus cordis*. ^{Scrobiculus cordis.}

Its outside is generally rough, for the better hold of the Muscles, which either spring from, or are inserted into it: The inside is smooth.

The *Ribs* are in Number twelve on ^{Ribs.} each side; seven *genuine* and five *spurious*. They are of an arched Figure, making an ^{Figure.} imperfect Segment of a Circle, more incurvated towards their Articulation with the *Vertebrae* (which is *per Gynghlymum Arthrodialem*) where they are rounder and harder than at the other Extremity towards the *Sternum*, which is less incurvated, much thinner, broader, more spongy, and join'd *per Harmoniam* with a Cartilage intermediate, which in Age often becomes Osseous.

They are fastned likewise to the *Vertebrae*, ^{Connex-} *per Syneurosin*, by means of their ^{ion.} Ligaments.

On the inside of the *true Ribs*, except ^{Sinus.} the Inferior, and sometimes the next to it, runs

runs a pretty deep *Sinus*, reaching from the end towards the Spine (where it is deepest) almost to its juncture with the Cartilage; which receives the *Intercostal Arteries, Veins* and *Nerves*, and lies just under the upper edge of each Rib.

Nothæ.

The five lower Pair of Ribs are called *Spurious*, and are shorter and more cartilaginous than the rest; of which only the first has any Connexion with the *Sternum*:

Connexion.

The rest growing still shorter every Pair than the other, are join'd by their Cartilages to the lower side of that next above them: To the *Vertebrae* of the Back, they are connected only by a simple Process.

Motion.

All these *Ribs*, together with the *Sternum*, are rais'd by means of the *Respiratory Muscles*, in the Action of Inspiration; by which means, and the Descent of the *Diaphragm* in that Action, the Cavity of the *Thorax* is enlarg'd, for the more commodious Expansion of the Lungs.

Muscles of the Thorax.

The *Muscles* of the *Thorax* serve for two several *Motions*; either to move the whole Cavity together upon the *Vertebrae*, as in bending and turning the Body; or the *Sternum* and *Ribs* only, as in *Respiration*; by which means its Cavity is alternately dilated and compressed, which occasion *Inspiration* and *Expiration*.

Division.

The *Muscles*, which perform these Actions, are divided into Common and Proper.

The

The Common are those, which though Common
 serving for the Motion of these Parts, have
 their Originations out of the Limits of the
Thorax. The Proper are such as both a- Proper.
 rise and terminate within the Bounds of
 the *Thorax*.

Among the *Common* may be reckon'd, Subcla-
 first, the *Subclavius*; which arises fleshy vius.
 from the inferior part of one half of the Ta. XXV.
Clavicula, and is inserted into the upper 9. 9.
 part of the first Rib, which it helps to ele- Action.
 vate.

Next, the *Serratus Major Anticus*; which Serratus
 arises from the whole *Basis* of the *Scapula*, Major
 and has a several Insertion into every one Anticus.
 of the *true Ribs*, and the first of the *Spu-* Ib. 16.
rious: Upon the three lowest of which, it
 is indented with the Teeth of the *Obliquus*
Descendens of the *Abdomen*, from whence it
 is called *Serratus*.

The *Serratus Minor Anticus*, springs Serratus
 from the *Processus Coracoides* of the *Scapu-* Minor
la, and descending obliquely, spreads it self Anticus.
 upon the second, third, fourth and fifth Ib. 10.
Ribs, into each of which it is inserted.
 This Muscle has been generally reckoned
 by *Anatomists* amongst those of the *Scapula*:
 But its Insertions into these *Ribs* plainly ju-
 stifie Mr. *Comper's* Conclusion, that it serves Action.
 to draw these *Ribs* upwards; which use
 gives it a place here.

Of

Scaleni. Of the *Scaleni* there are three Pair; the
 1.
 Ta. XXV. first of which springs fleshy from the trans-
 5. verse *Processes* of the second, third and
 fourth *Vertebrae* of the Neck; where de-
 scending laterally, it is inserted into the
 first Rib, which it helps to draw upwards.

Action.
 2.

The second *Scalenus* arises from the same
Processes, as likewise from those of the
 fifth *Vertebra* of the Neck, and is inserted
 into the second Rib, and sometimes into
 the third. Between this Muscle and the
 former, run the *Axillary Nerves*.

3. The third arises from the same *Proces-*
ses with the former, and from those of
 the sixth *Vertebra* of the Neck, and is
 inserted into the first Rib. All these draw
 the Ribs upwards; and are assisted by
 the *Serrati superiores postici*, and *Intercostals*
 of both kinds, which are esteem'd proper
 Muscles of the *Thorax*.

Serratus
 superior
 posticus.
 Tab. 27.

The *Serratus superior posticus*, lies im-
 mediately under the *Rhomboides*. It arises
 with a thin Tendon, from the lower Spine
 of the two last *Vertebrae* of the Neck, and
 from those of the three upper of the *Tho-*
rax, and running obliquely over the *Sple-*
nus and *Dorsi Longissimus*, is inserted in-
 to the second, third and fourth Ribs, at
 their Curvature, by so many several in-
 dented Insertions. These help to draw
 the Ribs upwards.

Action.

The

The *Intercostals*, of both kinds, are in number Forty four, and are plac'd in the Intervals of the Ribs; on each side eleven *external*, and eleven *internal*, which connect and draw together the Ribs. The Fibres of these Muscles run in an Order contrary to each other; which has made most Anatomists imagine, that they antagoniz'd one another, fancying that the *external* drew upwards, and the *internal* downwards.

Interco-
stals.
Tab. 24.

This erroneous Opinion was first refuted severally by the *Learned Steno*, and our *ingenious Dr. Mayow*: Whose Arguments, however convincing, have, nevertheless, fail'd of Success, over the Prejudices of many later Writers; who calling the upper part of the internal *Intercostals*, their Origin, and the lower their Insertion, will rightly enough have them to draw upwards; but believing that the Internal, upon the score of the contrary course of their Fibres, had their Origination and Insertion just the Reverse to the former, think they must needs act contrary; not considering, that which soever part of these short Muscles, they make the Head or Tail of them, the more moveable Point must necessarily be drawn towards the less moveable (which is the upper) without any regard to their Denominations: And that if these Muscles had opposite Motions, when the *external*

Action.

X x

were

were contracted; the *internal* must be flaccid and corrugated, contrary to the condition of all other Muscles, which are most extended in length, when over-power'd by their *Antagonists*. However, *Diemerbrook* is so confident of having demonstrated the Absurdity of Dr. *Mayow's* Opinion, that divers *Anatomists* still retain the old Division, and number the Internal among the *Depressors* of the Ribs.

Fibres
external.

The *Fibres* of the *external*, spring from the lower edge of the upper Rib, and running obliquely towards the *Sternum*, end in the outside of the upper edge of the Rib next below.

Internal.

Those of the *internal*, rise from the inside of the lower edge of the upper Rib, and running obliquely towards the *Vertebræ*, are inserted into the inside of the upper edge of the next Rib, decussating each other in right Angles, without any necessity of a contrary Action.

All these *Common Muscles* co-operate with the proper ones of the Ribs, in drawing them upwards; and tho' their united Force may seem to be infinitely greater than the proper weight of the Ribs would require, yet when we consider the weight of the Atmosphere, which antagonizes, we shall find nothing superfluous in this ample Provision; even tho' the Muscles which draw the contrary way are inconsiderable, compar'd with them: For tho' the

the several Insertions of these Muscles, may make them look as if they were destin'd to move different Parts and Ribs distinctly; yet the continuity of all the Ribs with the *Sternum*, obliges all these Muscles to act together, and to lift up the whole *Compages* of the *Sternum* and Ribs at once.

The *Common* Muscles, which serve for contracting the Cavity of the *Thorax*, by pulling down the Ribs, are the *Sacrolumbales*, and the *Diaphragma*; to which may be added the Abdominal Muscles; which being fix'd partly to the lower Ribs and *Sternum*, must necessarily in their Action, draw downwards. But of these last we have already given the Descriptions elsewhere.

The *Sacrolumbaris* hath its Origination in common with the *Dorsi Longissimus*; and externally arises tendinous, from the Posterior part of the Spine of the *Os Ilium*, the superior Spine of the *Sacrum*, and from all the Spines of the *Vertebrae* of the Loins. Internally it arises fleshy; not only from those Parts, but from the transverse Processes of the Lumbal *Vertebrae*; from whence to the lowest Rib, it seems to be form'd of two *Venters*: Where again, and upon the rest of the Ribs, it is distributed into a great number of Tendons (and, as *Sieno* will have it, *Venters* too) variously and irregularly distributed to every Rib; where,

Sacro-lumbaris.
Tab. 27.

Cervica-
les de-
scenden-
tes.

at their Insertions, they are met by other fleshy Fibres, coming from the third, fourth, fifth and sixth *Vertebra* of the Neck, which are justly enough, by *Diemerbrook*, esteem'd another pair of Muscles, *Antagonists* to these, and call'd by him, *Cervicales descendentes*. These should have been numbred amongst the Muscles that elevate the Ribs, but that they are generally by Authors reckon'd (tho' improperly) as a production and part of the *Sacrolumbus*.

Dia-
phragm.

The *Diaphragm* is a common Muscle, belonging in part to this Region of the Body. Both its Structure and Use hath been already spoken of, therefore we shall take no farther notice of it here.

Proper.

The *proper Muscles* employ'd in contracting the Cavity of the *Thorax*, are first,

Serratus
posticus
inferior.
Tab. 27.

The *Serratus posticus inferior*, arises from the *Spines* of three of the lower *Vertebrae* of the *Thorax*, and two upper of the Loins. Both its Extremities are tendinous, and its *Belly* fleshy, and ends with an indented Termination in the four lower *spurious Ribs*.

Triangu-
laris.

The *Triangularis*, which has sometimes the appearance of three or four distinct Muscles on each side, arises from the inside of the *Sternum*, and is implanted into the Cartilages, which join the four lowest true Ribs, to the *Sternum*. The *Action* of of this Muscle is very obscure, since they

have

have both their Origination and Insertion at a part not moveable, but together; towards which it is not easily conceivable, how they should contribute.

Perhaps their use is not really for Motion; which I am the rather apt to suspect, because they seem not to be affected by any *Antagonists*, but to be in a perpetual State of *Tension*, by which they may possibly conduce towards the forming of the necessary Incurvation of the *Sternum*; and by their over-tension in young *Children*, whilst the Cartilages are soft, may occasion that Morbid Acumination of the *Sternum*, which is observ'd in *Rickety Children*. The strength of this Conjecture might be much confirmed or abated, if it were found, that in young Children these Muscles were proportionably larger than in Adults. But of this I have made no Observation, nor do I find any Authors that have, and therefore leave it to farther Enquiry.

A Conjecture about their use.

X x 3

T A B.







- 21 The *Deltoides*.
- 22 The *Pectoralis*.
- 23 The *Coracobrachialis* partly seen.
- 24 The *Biceps Cubiti*.
- 25 The *Brachialis internus*.
- 26 Parts of the *Gemellus* in both the Arms.

27 The *Pronator Radii teres*, in the left Arm, running under the Tendinous Expansion of the *Biceps*.

- 28 The *Supinator Radii longus*.
- 29 The *Extensor Carpi radialis*.
- 30 The Extenders of the Thumb.
- 31 The *Adductor pollicis*.
- 32 The *Abductor indicis*.
- 33 Part of the *Flexor secundi Ossis pollicis*.
- 34 The *Radialis Flexor*.
- 35 Part of the *Flexor Digitorum Perforatus*.

36 The *Abductor pollicis* in the left Hand.
36 In the right Hand the *Extensor Digitorum communis*.

- 37 *Minimi Digiti extensor*.
- 38 The *Ulnaris extensor Carpi*.
- 39 The *Ulnaris flexor Carpi*.
- 40 Part of the *Teres major*.
- 41 Part of the *Latissimus Dorsi*.
- 42 Part of the *Serratus major Anticus*.
- 43 The *Intercostales externi*.
- 44 The *Obliquus Ascendens in situ*, with its Tendon running over the *Rectus* 47, to the *Linea Alba* h.

- 45 Part of the *Obliquus Descendens*.
- 46 The *Pyramidalis*.
- 47 The *Rectus Abdominis*.
- 48 The *Musculus Membranosus*.

** Part of its Membranous Expansion, which is implanted on the upper *Appendix* of the *Fibula* †.

49 Parts of the *Sartorius* on both Thighs.

50 Part of the *Glutæus medius*, under the Tendinous Production of the *Glutæus magnus*.

51 Part of the *Glutæus magnus*.

52 The *Rectus Femoris* in both Thighs.

53 Part of the *Triceps*.

54 Part of the *Gracilis*.

55 The *Vastus internus*, part of which is seen in the left Thigh.

60 The *Vastus externus*.

61 Part of the *Biceps Femoris*, near its Termination.

62 The *Tibialis Anticus*, in the left Leg, *in situ*; in the right Leg its Tendon only is expressed near its Termination.

63 The *Gastrocnemius internus* in both Legs.

64 The *Extensor Digitorum pedis longus*.

65 The *Peroneus longus*.

66 Part of the *Gastrocnemius externus* of the right Leg.

67 Parts of the *Soleus* in both Legs.

68 The long Tendon of the *Musculus Plantaris*.

69 Part of the *Tibialis posticus*, as it passes behind the *Malleolus internus*.

70 Part of the *Flexor Digitorum pedis perforans*

71 *Extensor pollicis pedis longus*, to be seen near its Termination only in the left Foot.

72 The *Abductor pollicis pedis*.

73 *Extensor Digitorum pedis brevis*.

74 *Abductor minimi digiti pedis*.

75 *Extensor Pollicis brevis*.

76 Part of the *Peroneus brevis*; the rest of it lying under the *Longus*, 65.

a, The *Os Jugale*.

b, The

- b, The Parotid Gland.
- c, Its *Ductus salivalis*.
- d, The lower Jaw-bone bared.
- ✝ Part of the *Inferior Maxillary Gland* seen.
- ee, The *Clavicula*.
- f, The *Sternum*.
- GG, The *Cartilaginous* endings of the Ribs, below the *Sternum*.
- g, The *Cartilago Ensiformis*.
- h, The *Linea Alba*.
- i, The *Navel*.
- k, The Spine of the *Os Ilium* bared, by removing the *Musculus Obliquus Descendens*.
- l, The Process of the *Peritoneum*, inclosing the *Spermatick Vessels*, as it passes thro' the *Musculus Obliquus Ascendens*, to the *Testes*.
- m, The *Os Pubis*.
- n, The *Glandula Inguinalis*.
- o, The great *Trochanter*, under the *Tendinous Expansion* of the *Gluteus magnus & membranofus*.
- p, The *Patella*.
- q, The lower *Appendix* of the *Os Femoris*.
- r, The *Tibia*.
- s, The *Malleolus internus*.
- t, The *Malleolus externus*.
- u, The *Ligamentum transversale pedis*.

C H A P. VI.

*Of the CLAVICLES, SHOULDER-BLADES,
BONES of the SHOULDERS, ARMS, HANDS
and FINGERS, with their MUSCLES.*

S Y L L A B U S

Eorum quæ sese offerunt circa

Claviculas	{	Substantia		
	{	Connexio duplex		
Scapulas	{	Substantia		
	{	Processus	{	Spina
			{	Acromium
			{	Coracoides
			{	Cervix
			{	Angulus
			{	Costæ
			{	Basæ
			{	superior
			{	inferior
Scapulæ	{	Serratus minor Anticus		
Musculos	{	Cucullaris seu Trapezius		
	{	Rhomboides		
	{	Levator Scapulæ		
	{	Serratus major Anticus		
Os Humeri	{	Ejus Caput		
	{	Protuberantia	{	externa
	{	Sinus	{	interna
Offis Humeri	{	Deltoides		
Musculos	{	Supraspinatus		
	{	Coracoideus		
	{	Teres major		
	{	Latissimus dorsi		
	{	Pectoralis		
	{	Infraspinatus		
	{	Teres minor		
	{	Subscapularis		
Offa Cubiti	{	Ulna ejus	{	Olecranon
	{		{	Ligamenta
	{		{	Processus Styloides
	{	Radius ejus	{	Sinus
	{		{	Ligamenta

Musculos

Membra	Cubiti	Biceps	
		Brachialis internus	
		Gemellus	
		Brachialis externus	
		Anconæus	
Membra	Radii	Pronator	Teres
			Quadratus
		Supinator	Longus
			Brevis
Manum	in	Carpum	
		Metacarpum	
		Digitos	Ligamentum Annulare
		Dorsum	
Divisam		Volam Manus	
		Carpi, No. 8	
		Metacarpi, No. 4	
		Digitorum, No. 12	Ligamenta communia
Ossa	Manus	Pollicis, No. 3	
		Sesamoidea, No. 10	
Volæ	Manus	Palmaris longus	
		Palmaris brevis	
		Flexor Carpi Ulnaris	
		Flexor Carpi Radialis	
Carpi		Extensor Carpi Ulnaris	
		Extensor Carpi Radialis	
Digito-	rum	Perforatus	
		Perforans	
		Lumbricales	
		Extensor communis Digitorum	
Interossei		Abductor Indicis	
		Abductor Auricularis	
		Extensor Indicis	
		Extensor Auricularis	
Flexor longus		Extensor longus	
		Extensor brevis	
		Abductor Pollicis	
		Antithenar	

ON the outside of the *Thorax*, besides those which constitute the Cavity of it, appear four Bones; two before, and two behind.

Clavicu-
læ.

Tab. 21,
& 22.

Those before are two small Bones, situated at the bottom of the Neck, on each side; in length about half a Foot, and about the thickness of the lower part of a Man's Finger; a little bent towards each end different ways, somewhat like the Letter S.

Substance.

Their inner Substance is spongy, which renders them very brittle, and easie to be broken, and again disposes them as easily to coalesce upon setting, and without any Manual Operation, they will frequently do so in Children.

Connexion

They are join'd to the *Acromium* of the *Scapula*, by a flat thick Head *per Synchondrosin*; and on the fore-part by a round Head *per Arthrodiam* to a *Sinus* on each side of the upper part of the *Sternum*.

Use.

It serves to fix the Shoulder-blade, so as to keep it from slipping too forwards upon the *Thorax* in Men and those Animals which use their fore-Legs or Hands, as *Monkies, Squirrels, &c.* In hoofed Animals, who use their fore-legs for nothing but to tread upon, the *Clavicles* are very small; being under a necessity of bringing their Fore-legs very near each other in walking, &c.

The

The *Scapula*, or *Omoplatea*, in *English* the *Scapulæ*.
Shoulder-blades, are two large, broad Bones, *Tab. 22.*
 of the Figure of an irregular Triangle of
 unequal sides, situated on each side of the
 upper and back part of the *Thorax*; of a
 pretty solid firm Contexture, though very *Substance.*
 thin in some places. The upper, or out-
 side of it is somewhat convex; the inner a
 little concave: The edges, which are pret-
 ty thick, are call'd the *Costæ*; and along *Costæ.*
 the middle of the outside lengthways runs
 a large long *Process*, which is call'd the
Spine; betwixt the bottom of which, and
 the *Costæ*, lies the thin part of the Bone.
 The end of the *Spine*, which receives the *Spine.*
 the extremity of the *Clavicula*, is called
Acromium. The second, which is some- *Acromi-*
 what lower, is short and sharp, and from *um.*
 a fancy'd similitude to a *Crow's Bill*, is cal-
 led *Coracoides*. The third, which makes *Coraco-*
 the Head of this Bone, has in it a pretty *ides.*
 large, but shallow round *Sinus*, lin'd with *Cervix.*
 a Cartilage, which receives the Head of
 the *Os Humeri*.

It serves to receive the Heads of the *Clav-* *use.*
icula and *Humerus*, and to give rise to
 the Muscles which move the Shoulder.

There are four Pair of *Muscles* ordinarily *Muscles.*
 assign'd to the *Scapula*; of which the first is
 the *Serratus minor Anticus*: Which having *Serratus*
 its other extremities upon the *Ribs*, which *minor*
 are more easily moveable than the *Scapula*, *Anticus.*
Tab. 25.
 has

has been describ'd amongst the Elevators of the *Thorax*.

Cucullaris.
Tab. 26.

More properly to be reckon'd three.

Action.

Rhomboides.
App. Tab.
46. & 41.

The next is the *Cucullaris*; so call'd from the resemblance of a *Monk's Cowl*; or *Trapezius*, from the Geometrical Figure, call'd *Trapezium*, to which, another way consider'd, it bears a Similitude. This Muscle might more justly be reckon'd three, as well upon the score of the various Origination of its Fibres, as from their different Actions. The upper Order of Fibres (or *Muscle*) springs from the *Os Occipitis*: The second from the Spine of all the *Vertebræ* of the Neck; and the third from the Spines of the eight upper *Vertebræ* of the *Thorax*, or Back, and are inserted into the Spine *Acromium*, and *Basis* of the *Scapula*, and to part of the *Clavicula*. From the different Dispositions of these Fibres, the *Scapula* is drawn different ways; the first pulling obliquely upwards, the last, according to their situation, obliquely downwards, and the middle backwards. When they act all three together, they are said to draw backwards only; that is, in truth, the two Extremes antagonizing, the middle is only at liberty, and does really act.

Under this lies the *Rhomboides*; so call'd, from its Figure; which arises from the two inferior *Spines* of the *Vertebræ* of the Neck, and the four first of the *Thorax*; whence descending obliquely, it is inserted into the whole

whole length of the *Basis*, or lower edge of the *Scapula*, which it draws backwards, and *Action.* a little upwards.

The third (or according to the reckoning of some, the fourth) is the *Levator Scapulæ*; call'd also *Musculus Patientiæ*, from the *Action* of shrugging up the Shoulders in forc'd Submissions. This arises, by separate Originations, from the *transverse Processes* of the second, third, fourth and fifth *Vertebra* of the Neck, and is inserted into the upper Angle of the *Scapula*, which *Action.* it pulls backwards.

The upper Bone of the Arm, which is by some call'd *Humerus*, and *Os Humeri*, reaches from the Shoulder or shallow socket in the Neck of the *Scapula*, to the upper end of the *Cubitus*, at the Elbow. It is a large, long, round, fistulated Bone, of a pretty hard compact Substance; and its inward Cavity, which contains the Marrow, is pretty long and large. At the upper end it has a large round Head, which is covered with a very smooth Cartilage, which is receiv'd into the Cavity of the *Scapula*, and makes a Juncture *per Arthrodiām*. This Head of the Bone being much larger than the Socket, into which it is receiv'd, the Part extant is strictly embrac'd by a Ligament, one edge of which is fastned to the Margin of the Cartilaginous Socket of the *Scapula*; the other to the lower part

part of the Head of this Bone, thereby uniting them firmly together, yet so as to leave the Motion the freest of all the Articulations of the Body, and therefore liable to Dislocations.

Lower end At the lower end it has two *Processes*, cover'd each with a Cartilage; one External, which receives the extremity of the *Radius*, which is the lesser of the two: The other Internal, which being larger, receives the Head of the *Cubitus*. On the outside of each of these *Processes*, there is a small Tubercle, or Eminence (as it were a little Process budding out of a greater) to which are connected the Ligaments and Heads of the Muscles, which move the *Carpus* and Fingers, of which anon. In this Bone are three *Sinus*: One on the fore-side of the larger Process, which receives the fore-Process of the *Cubitus*: Another on the back-part, which receives the hinder Process of the *Cubitus*, call'd *Olecranon*; and a third, a small semilunar one, between the two Processes, answering to the Eminence of the *Sinus* of the *Cubitus*.

Muscles. The later *Anatomists* are generally agreed in allowing to the Motion of this Bone five Pair of *Muscles*, and five different sorts of Motions; *Upwards*, *Downwards*, *Forwards*, *Backwards* and *Rotatory*.

Upwards. The *Arm* is mov'd upwards by the *Deltoides*, *Supraspinatus*, and *Coracobrachialis*. The

The *Deltoides*; so call'd from the Greek Δ which it resembles, is a large strong Muscle, arising from the middle of the *Clavicle*, the *Acromium*, and the whole length of the Spine of the *Scapula*, and is inserted into the middle of the *Os Humeri*, on the inner side. *Steno* makes twelve distinct Muscles, which according to the course of their several Fibres, alter and compound the Motion of this Bone.

Deltoides.

Tab. 23,
24, 26.

Vid. App.

Tab. 45.

Fig. 5.

The *Supraspinatus* has its Name from its fleshy Origination, at the upper end of the *Basis* of the *Scapula* above the Spine, to the upper part of which it is likewise connected, and to the superior Rib of the *Scapula*; whence marching along the upper *Interscapulium* (or thin part of the *Scapula*, between the upper *Costa* and Spine) which it fills, it passes under the *Acromium* and Articulation of the *Humerus*, and embraces with its Tendon the Neck of that Bone.

Supraspinatus.

Tab. 27.

The *Coracobrachialis* arises partly fleshy, partly tendinous, from the *Processus Coracoides* of the *Scapula*, and passing over the Joint of the *Humerus*, is inserted into the middle of the inner part of the Bone, which therefore it draws somewhat obliquely outwards, as well as upwards.

Coracoides.

Tab. 25.

The Muscles drawing downwards, are *Teres*, or *Rotundus major*, and the *Latissimus Dorsi*.

Downwards.

Y y

The

Teres or
Rotun-
duſ
major.

Tab. 26,
27.

The *Teres major* ariſes from the lower Angle of the *Baſis* of the *Scapula*, and aſcending obliquely upwards, in a round, ſmooth Body, under the Head of the *Longus*, is inſerted with a ſhort flat Tendon, into the Neck of the *Os Humeri*, cloſe by the following; which is the

Latiffi-
muſdorſi.

Tab. 26.

Latiffimus Dorſi, and ariſes thin, broad and tendinous, from the ſeven lower *Vertebrae* of the *Thorax*, from all thoſe of the Loins, and the ſuperior of the *Os Sacrum*, and the poſterior part of the Spine of the *Os Ilium*. In its Paſſage over the *Longiſſimus Dorſi*, *Sacrolumbus*, and the Incurvate part of the Ribs, it begins to grow thick and fleſhy, by means of ſeveral *Faſciculi* of Fibres, which it receives from the Ribs: But its Body is again extenuated in its Paſſage towards the *Axilla*, over the lower Angle of the *Scapula*, and is at laſt inſerted into the *Os Humeri*, juſt by the *Teres major*, with a broad, ſtrong Tendon. This Muſcle is by ſome call'd *Aniſcalptor*; a Name which ſufficiently implies its Action downwards and backwards.

Aniſcal-
ptor.

Pectora-
lis.

Forwards.

Tab. 23, 24

The *Pectoralis*, which is the only Muſcle that properly moves the Arm *forwards*, ariſes broad and fleſhy, with a ſemi-circular Origination, from part of the Clavicle, *Sternum*, Cartilages of the ſix ſuperior Ribs, and bony part of the ſeventh, and from ſome of the upper of the ſpurious Ribs.

Thoſe

Those Fibres which spring from these lower Parts, running across, and decussating those which spring from the upper, make together a Body of a Muscle, which covers almost all the fore-parts of the *Thorax*, and is at last inserted by a thick, short, strong Tendon, into the upper and inner part of the *Humerus*, between the *Biceps* and *Deltoides*. The lower Fibres making the upper part, and the upper the lower part of the Tendon. This draws the Arm forwards.

The *Infraspinatus* arises from the *Inferior* Parts of the *Basis*, *Spine* and under *Costa* of the *Scapula*, and filling the lower *Interscapulium*, passes on between the *Spine* and *Teres minor* in a *Triangular* Form, and growing tendinous at the *Cone* is inserted into the Head of the *Humerus*, and draws directly backwards.

Infraspinatus.
Tab. 26, 27

The next is the *Transversalis*; call'd also *Teres*, and *Rotundus minor*, which is sometimes wanting, or so confounded with the former, as to be lost in it. It arises from the inferior Angle of the *Scapula*, and ascending obliquely in a round fleshy Body, and passing over the upper Head of the *Longus*, is inserted by a short flat Tendon, below the Neck of the *Os Humeri*.

Transversalis.
Tab. ib.

The *Subscapularis* arises from the *Basis* and *Costa* of the *Scapula*, and spreading it self

Subscapularis.
App. Tab. 42. Fig. 2.

self under the whole convex or under-side of it, is inserted by a semi-circular Tendon into the Neck of the *Os Humeri*, and draws it down to the side of the Trunk.

Rotatory
Motion.

The Tendons of these three last Muscles make together a Circle about the Head of the *Humerus*, and acting successively after each other, give a *Rotatory Motion* to the whole Arm.

Cubitus.

The Bones of the next Joint, which reaches from the Elbow to the Wrist, are the *Cubitus*, or *Ulna*, and *Radius*, upon which all the rest of the Arm and Hand below the *Humerus* is mov'd together.

Ulna.

Tab. 21, 22

The *Ulna* is a pretty large, long, solid Bone, without any considerable Cavity for Marrow: The outside of it is convex, the inner concave, having a *Fossula*, or indented Chink running along its middle the whole length of it. It is bigger on the upper towards which it descends, as it were tapering. At its Head, or upper end, it is join'd to the *Os Humeri per Ginglymum*, by means of its *semi-lunar Sinus*; which receives the inner Protuberance of the lower end of the *Os Humeri*, and sends off two *Processus*, both call'd *Rostra*, one on the fore-part, which enters the fore and lesser *Sinus* of the *Os Humeri*; the other larger on the hinder-part, and longer, called (after *Hippocrates*) by a peculiar Name, *Olecranon*; which is receiv'd into the

Gingly-
mus.

Olecranon.

the hinder *Sinus* of the aforefaid Bone, forming thereby a perfect *Ginglymus*; whereby it is moved upon this Bone as by a Hinge, which is strengthened and secured by the *Ligaments*, which from these *Processes* are sent up to the *Humerus*, as well as by those, which descend to it from the *Lateral Tubercles* of the *Processes* of the *Humerus*, already mention'd. Ligaments.

It has also at its upper end another small lateral *Sinus* on the inside, which receives the circumference of the round Head of the *Radius*, which rolls upon it for the *Pronation*, or turning down of the Palm of the Hand; or *Resupination*, which is the turning of it up; which Motions are perform'd here by means of the *Radius*.

The lower end of the *Cubitus* is small and round, and is receiv'd into the lower end of the *Radius* by a *Sinus* in the side of it. Upon this extremity the *Ulna* has a small Process call'd *Styloides*, from which arise the *Ligaments* which fasten it to the Bones of the *Radius*, and tie those Bones likewise to one another.

The *Radius* is a long slender Bone, which descends along with the *Ulna*, from the Elbow to the Wrist, touching only at the extremities; at the upper of which it is received by the *Cubitus*, as the lower receives it, making by both *Articulations* an imperfect sort of *Ginglymus*. The upper Radius, or Focileminus. Tab. 21, 23

Sinus.

Vid. Tab.
21, 22.Muscles
of the
Cubit.Biceps.
Tab. 23, 24

end of this Bone, which rolls upon the *Ulna*, is cover'd with a *Cartilage*, and has on its top a small round Indentation, or *Sinus*, which receives the outer Process of the *Humerus*. The lower end of this Bone is thicker than the upper; and has besides the lateral *Sinus*, which receives the *Cubitus*, two other *Sinus* at its extremity, which receives the Bones of the Wrist: Both these Bones are a little incurvated, by which means they are kept from approaching each other, except at their Extremities; and are ty'd together by a strong membranous *Ligament*.

The *Muscles* of the *Cubit* are in number five; two *Flexors*, and three *Extensors*. The *Flexors* are first.

The *Biceps*, so call'd from its springing from two *Heads*; one of which rises round and *tendinous*, from the upper edge of the *Neck* of the *Scapula*, and is convey'd along the Channel, in the *Head* of the *Humerus*. Mr. *Comper*, in his Book of the *Muscles*, tells a remarkable Case of a *Dislocation*, or slipping of this Head out of this Channel. The other arises from the *Processus Coracoides*, broad and *tendinous*, and both together unite on the fore-part of the *Humerus*, about the middle, and is by most *Authors* said to terminate in a round strong *Tendon*, into the *Tubercle*, at the upper end of the *Radius*. But Mr. *Comper* has ob-

ob-

observ'd it to be double, and to expand it self in form of a Membrane, over the *Pro-nator teres Radii*, and to join with the *Membrana communis Musculorum* of the *Carpus* and *Fingers*. This may be accounted common to both *Radius* and *Cubitus*.

The next is *Brachæus internus*; which lies under the former, and arises fleshy from the internal part of the *Humerus*, at the Insertion of the *Deltoides* and *Coracobrachialis*, and running over the Junction of the *Humerus* and *Cubit*, is inserted partly fleshy, partly tendinous, into the superior and fore-part of the *Ulna*, and bends the Arm.

Brachæus internus.
Tab. 23.

The next is *Gemellus*, or *Biceps externus*; which rises with two Heads: One tendinous from the upper part of the inferior *Costa* of the *Scapula*; whence it passes between the two round Muscles to the back-part of the *Humerus*, where it joins its other Head; from whence they run both together, to their Insertion at the *Ancon*, or tip of the Elbow, made by the *Olecranon*, or outer Process of the *Cubit*. This is the first *Extender* of the *Cubit*, and is by most Authors reckon'd two distinct Muscles; the first being call'd *Longus*, and the other *Brevis*.

Gemellus
Tab. 26, 27

The third is the *Brachæus externus*: It arises from about the middle of the back-part of the *Humerus*, a little below the

Longus.
Brevis.
Brachæus externus.
Tab. 16.

Brevis, and goes to one common Insertion with the former at the *Olecranon*. This may also be reckon'd a third Head of the same Muscle; which may therefore be call'd *Triceps Brachialis*.

Anconæ-
us.
Tab. 26, 27

The *Anconæus* arises from the inferior and back-part of the *Humerus*, and is inserted laterally into the *Ulna*, about an Inch, or Inch and half below the *Olecranon*. These are all *Extenders*.

Muscles
of the
Radius.

The *Radius* has besides the *Biceps*, which is Common, four *Proper* Muscles; which serve to make it roll upon the *Cubit* or *Ulna*.

Pronator
Radii
teres.
Tab. 25.

The first is the *Pronator Radii teres*, by some call'd *superior Rotundus*; which arises fleshy from the internal Extubérance of the *Humerus*, and is inserted obliquely into the middle of the *Radius* outwards.

Pronator
Radii
quadra-
tus.
App. Tab.
42. Fig. 5.

The next is the *Pronator Radii quadratus*, or *inferior*; which arises broad and fleshy, from the lower and inner part of the *Ulna*, and passing over the Ligament, that joins the *Radius* and the *Cubit*, is inserted broad into the upper and external part of the *Radius*. Both these turn the Palm of the Hand inwards.

Supina-
tor.
Longus.
Tab. 24.

The other two are the *Supinatore*s: The first, which is call'd *Longus*, arises broad and fleshy, from the superior and external part of the *Humerus*, two or three Fingers breadth below the Insertion of the *Deltoides*,

des, and descending obliquely, is inserted with a broad flat Tendon, into the external and lower part of the *Radius*, near the *Carpus*.

The second is the *Supinator brevis*; which arises tendinous and fleshy from the upper part of the outside of the *Ulna*, and passing obliquely over the *Radius*, is inserted into its upper and fore-part, just below the Tendon of the *Biceps*. These turn the Palm of the Hand upwards.

Supinator Brevis.

Tab. 27.

Tho' our Method has oblig'd us to describe the Muscles of the *Radius*, immediately after those of the *Ulna*, that the Action of those two Bones, so extraordinarily united, may be seen together: Yet it is worth the notice of a young *Dissector*, that these four last Muscles are not fairly to be exhibited by the Knife, till the Muscles of the *Carpus*, *Vola*, or *Palm*, and even of the *Fingers*, have been examin'd, and in part at least rais'd.

The Hand, which is by some call'd *extrema Manus* (these reckoning the Arm and Shoulder-bone into the Hand) is divided into three Parts: The *Carpus*, in English, the Wrist; the *Metacarpium*, which alone is in Vulgar English call'd the *Hand*; and the *Fingers*.

Manus?

Parts.

The *Carpus*, or Wrist, consists of eight small Bones, of different Figures and Sizes; these lie in Rows or Ranks, four in each.

Carpus.

Tab. 21, 22

The

The upper four of which are articulated on their superior Part, with the lower end of the *Radius*; the under four to the Bones of the *Metacarpus*. They are firmly fastened together to one another, by the Ligaments that come from the *Radius* before-mention'd, and by that expansion of the Tendon of the *Biceps*, which in the Description of that Muscle, we have taken notice to have spread it self over all those Parts.

Fascia
tendinosa

Metacar-
pium.
Tab. 21, 22

Dorsum
Manus.

Vola.

The *Metacarpium* only consists of four Bones, reaching from the four lower Bones of the *Carpus*, to the first of the *Fingers*. These are long, slender and fistulous, having within a Cavity pretty considerable for their size, fill'd with Marrow. They are a little incurvated, convex on the exterior part, which is call'd *Dorsum Manus*, which with us is call'd the *Back* of the *Hand*; and concave on their interior, which is call'd *Vola*, or the *Palm* of the *Hand*. These Bones, like those of the *Radius* and *Cubitus*, touch one another only at their Extremities, leaving Interstices in the middle, for the passage of the *Musculi Interossei*. At the upper end of each is a small *Sinus*, which receives the Bones of the *Wrist*; and at the lower end a small round Head, which is receiv'd by a small *Sinus* in the Bones of the *Fingers*.

The

The Bones of the *Fingers* are in each Hand *fifteen*, three to the *Thumb*, and three to each *Finger*, dispos'd in three Rows, which are call'd *Phalanges*; the upper of which is the longest and largest, the second less, but longer and larger than the third. They are all a little round, and convex on the back-part, but flat and plain on the inside, with a very small Hollow: Laterally they have a small Convexity between the extremities of each Bone, of the two first Rows especially, made by the Protuberance of their extremities, which wearing off gradually, makes the Depression most considerable in the middle. This in the two middle Fingers is alike on both sides, but in the fore and little Finger, greater on the inside than the outer. The upper Row has in the Head of each Bone a small *Sinus*, which receives the Protuberances of the Bones of the *Metacarpium*. At the lower end they have a little round Head, which is receiv'd again by the Bones of the *second* Row; which have like the former, each a Cavity at the top, and a Protuberance at the bottom, for the same use. The third, and last, receive the second as they did the first.

The *Thumb* is immediately articulated with the *Carpus*; and its Bones, with respect to one another, bear the same Number, Order, Proportion and Articulation with the former.

Bones
of the
Fingers.
Tab. 21, 22

In

In the Articulations of the Bones of the two lower Joints with each other, and the first, the Eminence of the Bone receiv'd, is as it were parted into two; and accordingly, the *Sinus* in the Bone below, which receive them, must be so.

Offa Se
famoidea.

Besides these, there are *fifteen* very small Bones, call'd *Sesamoidea*, from some fancy'd resemblance in Bulk and Figure to Grains of *Sesamum*; and are plac'd, one on the inside of each *Internodium*, or Joint of the Fingers, and seem to serve as a sort of *Trochlea*, or *Pullies* for the Tendons that bend the Fingers, and may be reckon'd as little *Patellæ*.

Liga-
ments.

Long.

Annulare
Tab. 23.
N.

These Bones are held together by several *Ligaments*, two whereof serve particularly for the Bones of the *Carpus*; one, a long one, rising from the lower part of the *Cubitus* and *Radius*, and spreading over the Bones of the *Carpus*, connects them together: The other is a round one, or as some will have it, two transverse, that meet together, and enclose the *Carpus* in the manner of a broad Ring. There are several Fibres interspers'd about the Bones of the *Metacarpus* and Fingers, and which serve to connect them together, but have no particular Names or Descriptions.

The *Muscles* of the *Carpus*, or *Wrist*, come next to be describ'd, according to our Method: But the *Muscles* of the
Palm

Palm of the Hand lying immediately over them, and having some Influence on the Motion of the *Carpus*, we shall begin with them.

These are in Number two: The first is call'd *Palmaris Longus*, and rises from the internal Extuberance of the *Humerus*, with a narrow Origin, which soon increases to a fleshy *Belly*, and again becoming tendinous, runs in a flat slender Tendon along with the Tendon of the *Flexor Carpi superior*, to which it sometimes firmly adheres; whence running over the *Ligamentum Annulare*, it expands it self, and cleaves fast to the Skin of the *Palm*, and is inserted laterally, by a several Tendon, into the Root of each Finger. The fleshy beginning of this Muscle, has been observ'd to be sometimes wanting, or perhaps so perplex'd with the Fibres of other Muscles, as to be lost to Observati-on: A thing very common amongst the Muscles, and which probably has occasion'd those great differences among Anatomists, in their Accounts, as to the Number and Structure in almost all Parts of the Body.

Muscles
of the
Palm
of the
Hand and
Wrist.
*Palmaris
Longus.*
Tab. 23.

The second is the *Palmaris Brevis*, or *Palmaris Quadratus*: A Muscle by many Anatomists not taken notice of, tho' describ'd by *Fallopius*, *Spigelius* (who calls it *Caro quadrata*, and makes it serve to extend the Hand) and some other Anatomists, but very im-

*Palmaris
Brevis.*
Ibid.

per-

perfectly. It arises from the outside of the Bone of the *Metacarpus*, which is articulated with the little Finger, and from one of the *Carpus*, with a broad membranous Tendon, and running transverse, is inserted into the eighth Bone of the *Carpus*.

Action.

The first of these serves to contract the *Palm* in grasping: The second to draw it into a hollow Figure.

*Division
of the
Bones
of the
Wrist.*

*Flexor
Carpi
Ulnaris.
Tab. 23, 25*

The Muscles properly of the *Wrist* are four: Two *Flexors*, which are internal; and two *Extensors*, which are external.

The first *Flexor* is the *Cubitus internus*, call'd also *Flexor Carpi Ulnaris*; which arises tendinous from the inner Extubérance of the *Humerus*, and upper part of the *Ulna*, upon which it runs along, till passing under the *Ligamentum annulare*, it is inserted by a strong short Tendon, into the fourth Bone of the first Row of the *Carpus*.

*Flexor
Carpi
Radialis.
Ibid.*

The next is *Radius internus*; which rises from the same Part with the former, and running along the *Radius*, is inserted into the upper part of that Bone of the *Metacarpus* which is join'd with the Fore-finger. Both these Muscles bend the *Wrist*.

Action.

*Extensor
Carpi
Ulnaris.
Tab. 26.*

The first *Extensor*, is the *Cubitus internus*, or *Extensor Carpi Ulnaris*; which coming from the external Protuberance of the *Humerus*, and passing tendinous under the *Ligamentum annulare*, is inserted into the upper part of the Bone *Metacarpium*, that
answers

answers the little Finger. If this and the *Ulnaris Flexor* move together, they draw the Hands sideways towards the *Ulna*. Action.

The next is the *Radialis externus*, call'd also *Bicornis*, and *Extensor Radialis*; which is rather two distinct Muscles: The outermost arising fleshy, above the external Protuberance of the *Os Humeri*; the inner below that Protuberance. Both run along the exterior part of the *Radius*, and passing under the Tendons of the *Extensores pollicis* and *Ligamentum annulare*, are inserted into the upper parts of the Bones *Metacarpium*, that articulate with the fore and second Finger. These, with the *Radialis internus* together, draw the Hand sideways towards the *Radius*: With the Muscle fore-going they conspire to extend it. Extensor Carpi Radialis. Tab. 26.

The Muscles of the Fingers are some common to all the Fingers, and some proper. The common ones are those which have their Origins from the Bones of the Arm, as the *Sublimis*, *Profundus*, *Lumbricales*, and the *Extensor communis Digitorum*. The proper are such as have their distinct Originations and Terminations without intermixture, in each respective Finger. These are the *Interossei*, the *Extensor* and *Abductor Indicis*, the *Extensor* and *Abductor* of the little Finger. Action.

The first of the common is the *Sublimis*, or *Perforatus*; so call'd from the Perforations. Muscles of the Fingers. Tab. 25.

ons of its Tendons by those of the *Perforans* next to be describ'd, and *Flexor secundi Internodii*, from its Action. It arises tendinous, from the internal Protuberance of the *Humerus*, between the *Flexores Radii*, and from the upper part of the *Radius* before; and being parted into four, passes under the *annular Ligament*, whence it sends a several Tendon into the upper part of the second *Phalanx* of each Finger; every Tendon having at the first Internode, a Slit or Perforation for the Admission of the Tendons of the *Profundus*,

Perforans.

Tab. 25.

App. Tab.

42. Fig. 4.

Or *Perforans*, or *Flexor tertii Internodii*; which arises fleshy from the fore and upper part of the *Ulna*, and from the Ligament which joins that and the *Radius*, and after having form'd a pretty thick fleshy Body, is split into four round Tendons, which passing under the *annular Ligament*, and thro' the Slits in the Tendons of the former, are inserted into the third Bone of each Finger.

This Perforation thro' the Tendons of the former Muscle, and the membranous *Cases* which the Tendons of both these Muscles receive from the *Aponeurosis Palmaris*, is singular in these Muscles, and those of the Feet.

Lumbricales.
Ibid.

The *Lumbricales* are commonly suppos'd to be nothing but Branches of the Tendons of the *Perforans*, which go to the inside

of

of the first Bone on each Finger, and are *Action.* thought to contribute to the variety of Motions which the Fingers have, by giving a diversion to the direct Actions of the other Muscles; but simply, they only serve to draw the Fingers towards the Thumb. But Mr. *Comper* has observ'd some of them to have distinct Originals, and suspects that the rest may have so, and therefore makes them distinct Muscles.

The *Extensor communis Digitorum* arises sharp and tendinous, from the outward Extuberance of the *Humerus*, and becoming fleshy about the middle of its Progress, divides, and passes with three Tendons under the annular Ligament, and is inserted into all the Bones of the three first Fingers, near the first *Internodii*. These Tendons send some Fibres to each other, as likewise do the *Interossei* to them before they terminate.

Extensor communis digitorum.
Tab. 26.

The *Interossei* are in number eight, as some will have it, reckoning the *Abductores* of the *Index*, and *Auricularis* amongst them. They are divided into *Internal* and *External*: The *Internal* arise from the Bone of the *Metacarpus*, and lie in the Spaces that these Bones make towards the Palm of the Hand, from whence they send small Tendons to the insides of the lower *Phalanx* of the Fingers, and join with the Tendons of the *Extensor communis*. The *External* arise like-

Interossei
Ibid.

wise from the upper parts of the *Metacarpus*, towards the *Carpus*, and lie in the Interstices form'd by those Bones and send their short Tendons to the outsides of the first Bones of the Fingers; but their longer Tendons join with those of the *Lumbricales*, and pass to their Insertions in common with the *Extensores Digitorum*. These not only draw the Fingers from each other, but serve to extend them.

Action.

Abductor
Indicis.
Tab. 26.

The *Abductor Indicis* arises from the inside of the Bone of the Thumb, and is inserted into the first Bone of the Fore-finger, which it draws towards the Thumb.

Action.

Abductor
Auricularis.
Tab. 27.

The *Abductor* of the *Auricularis*, or little Finger (by some call'd *Hypothenar*) springs from the *Ligamentum annulare*, and from the third and fourth Bone of the *Carpus*, in the second Rank, and is inserted externally into the first Bone of the little Finger, which it draws from the rest. Neither of these two can therefore be reckon'd among the *Interossei*; which strictly, are those only which arise from among the Bones of the *Metacarpus*: However, they serve, when they act all together, to expand the Fingers; and these do the same particular Office which some of the *Interossei* do for the other Fingers.

Action.

Extensor
Indicis.
Tab. 27.

Besides these Muscles proper to the Fore-finger, is the *Extensor Indicis*, which rising from the middle of the *Ulna* outwards, passes

passes under the *Annular Ligament*, and at the third Bone of the Fore-finger joins the *Extensor communis*.

The little Finger has likewise its proper *Extensor*, which arises from the external Pro-^{Auricularis.}tuberance of the *Humerus*, and partly from the *Ulna*, and passing under the *Annular Ligament*, is inserted into the outside of the third Bone of the Finger.

The Thumb is bent by two Muscles: Muscles
The first arises from the Internal Protube-^{of the}rance of the *Humerus*, and from part of the ^{Thumb.}
Radius by different Orders of Fibres, and ^{Flexores}
passing under the *Ligamentum Annulare*, is ^{pollicis.} inserted into the third Bone of the Thumb.
The second arises from the Bones of the *Carpus* and the *Annular Ligament*, and is inserted into the second Bone of the Thumb. These are call'd *Flexores pollicis*.

It is extended by two Muscles, which are call'd *Longus* and *Brevis*.

The *Extensor longus* arises from the up-^{Extensor}per and external part of the *Ulna*, and pas-^{longus.}sing over the Tendon of the *Radius exter-^{Tab. 26.}
nus, is inserted near the second Joint of the ^{5 27.}Thumb. This has two Tendons, and is separable into two Muscles, and is therefore frequently so reckon'd.*

The *Brevis* springs from the *Ulna*, a lit-^{Brevis.}tle below the former, and is inserted into ^{Tab. ib.}the third Bone of the Thumb.

Abductor
pollicis.
Tab. 23.

The *Abductor pollicis*, call'd also *Thenar*, springs from the *Ligamentum Annulare* and first Bone of the *Carpus*, from whence passing to the Thumb, it makes that fleshy Body which is call'd *Mons Luna*, and draws the Thumb from the Fingers.

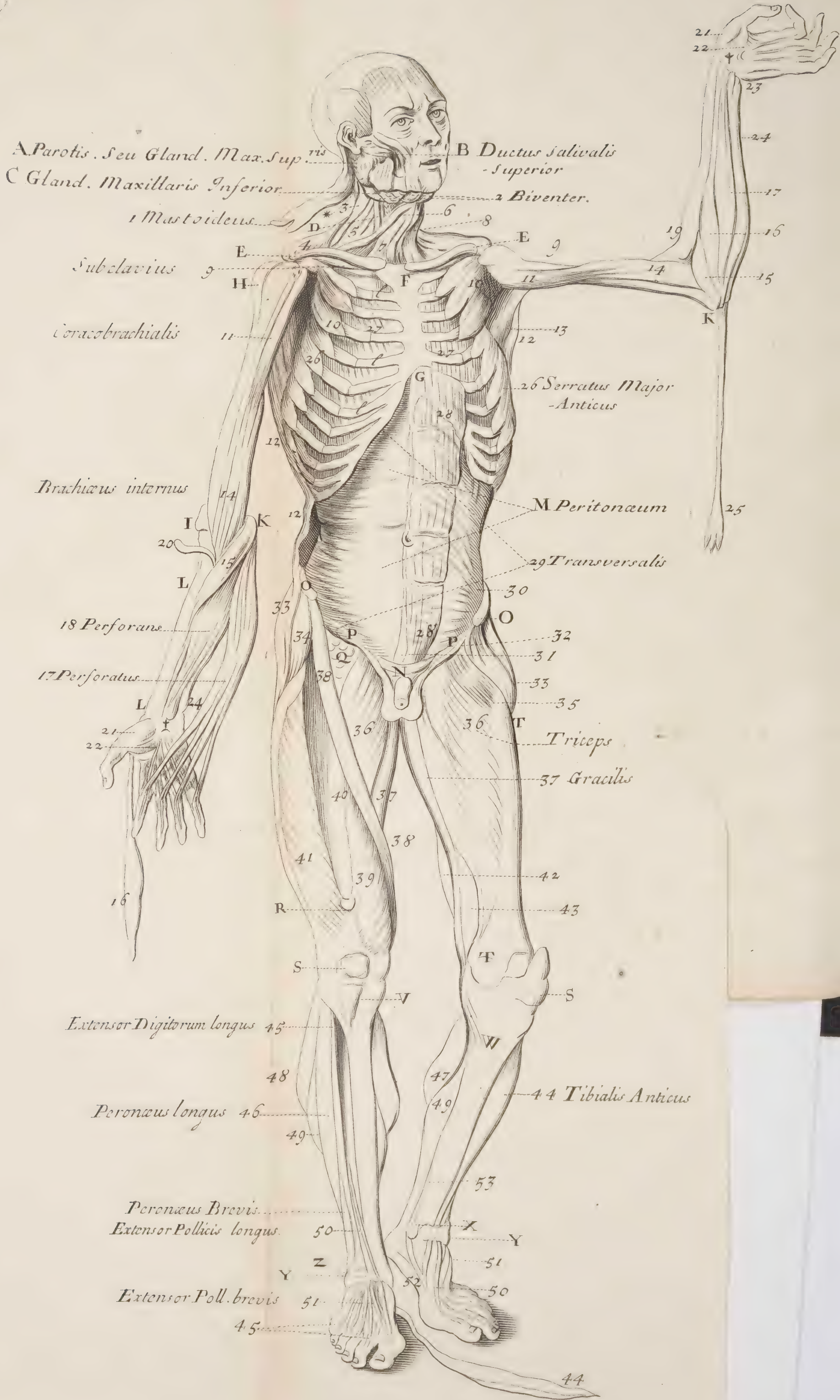
Antithenar.
Tab. ib.

The *Antithenar* springs from the Bone of the *Metacarpus*, that sustains the Bone of the Fore-finger, and is inserted into the fore-side of the first Bone, and draws the Thumb to the Finger.

T A B.

Tab. XXV.

pag.



Tab. XXV.





T A B. XXV.

Some of the Inferior Muscles that appear on the Fore-part of the Body after their Superior and External ones are remov'd.

TH E Muscles of the *Face* being referr'd to in the two preceeding Tables, need no further Explication in this.

A, The *Parotid*, or *superior Maxillar Gland*.

B, Its *Salival Duct* passing over the *Masseter* Muscle, before it goes thro' the *Buccinator*.

C, The *inferior Maxillar Gland*.

1 The *Musculus Mastoideus* rais'd from the *Sternum* and *Clavicula*, and left at its Termination behind the *Processus Mastoideus*.

2 The *Biventer*, or *Digastric Muscle* in situ.

3 Part of the *Levator Scapulae*.

* Part of the *Splenius*.

4 Part of the *Cucullaris* fix'd to the *Clavicle*.

5 Parts of the *Scaleni*.

6 The *Coracohyoideus* bared.

7 Part of the *Sternothyroideus*.

8 The *Sternohyoideus*.

D, The *internal Jugular Vein*.

EE, The *Clavicula*.

F, *Os Pectoris*, or *Sternum*.

G, The *Ensiform Cartilage*.

H, A *Sulcus* in the *Os Humeri*, in which passes the Tendon of the External Head of the *Biceps*, here cut off.

I, The External Protuberance of the *Radius*.

K, The Internal——

LL, The *Radius*.

Z z 3

II, The

ll, The Cartilaginous endings of the Ribs.

M, The Tendon of the transverse Muscle of the *Abdomen*, passing to the *Linea Alba* close upon the *Peritonæum*.

N, The *Os Pubis*.

O, The Spine of the *Os Ilium*.

PP, The Processes of the *Peritonæum* inclosing the Spermatick Vessels.

QQ, The *Glandula Inguinales*.

R The Tendon of the *Rectus Femoris*, or *Tibia* cut off at its union with the two *Vasti*.

SS, The *Patella*.

TT, The *Thigh-bone* bared.

V, The Tendons of all the extending Muscles of the *Thigh*, between the *Patella* and its Termination on the upper part of the *Tibia*.

W, The *Tibia*, or larger Bone of the Leg.

X, The *Malleolus internus*, or inner *Ankle-bone*.

Y, The *Ligamentum Annulare*.

Z, The *Malleolus externus*, or outward *Ankle*.
9 *Musculus Subclavius*.

10 *Serratus minor Anticus*.

11 *Corobrachialis*.

12 Part of the *Latissimus Dorsi* on both sides.

13 Part of the *Rotundus major*.

14 *Brachialis internus*.

15 *Pronator Radii teres*.

16 *Radialis Flexor* in the right Hand hanging down to its Tendon.

17 *Perforatus* in both Arms; that in the Right being rais'd to shew the Slits in its Tendons, thro' which pass the Tendons of the

18 *Perforans*.

19 Part of the *Supinator Radii longus* in the left Arm.

20 The

20 The Tendon of the *Biceps*, that ends in the upper part of the *Radius*.

21 *Abductor Pollicis*.

22 *Flexor secundi Ossis Pollicis*.

23 *Abductor minimi digiti*.

†† The *Ligamentum Annulare* in both Hands.

24 Part of the *Flexor Carpi Ulnaris*.

25 The *Palmaris longus* rais'd from its Termination, and hanging at its Origin, from the internal Protuberance of the *Os Humeri*.

26 The *Serratus major Anticus*, clear'd at its infertion into the Ribs on both sides.

27 The *Intercostales externi*.

28, 28 The *Rectus Abdominis* on the left side.

29 The *Transversalis Abdominis* with its Tendon passing on the *Peritonæum* M to the *Linea Alba*.

30 The *Obliquus ascendens in situ*.

31 The *Pyramidalis*.

32 The *Cremaster* Muscle, descending from its Origin at the fore-part of the Spine of the *Os Ilium* on the *Processus Peritonæi* to the *Testes*.

33 The fore-parts of the *Gluteus medius* on both sides

34 The *Musculus Membranosus* at its Origin from the Spine of the *Os Ilium*.

35 The *Pectineus*.

36 The *Triceps* in both *Thighs*, that of the Left being laid bare.

37 The *Gracilis*.

38 *Sartorius*.

39 *Vastus internus*.

40 The *Crureus*, as it appears after the *Rectus Femoris* is remov'd.

41 *Vastus externus*.

42 Part of the *Seminervosus*.

43 Part of the *Semimembranosus*.

44 The *Tibialis Anticus in situ*, on the left Leg, and dissected, lying on the Ground from the Right.

45, 45 The *Extensor digitorum pedis longus in situ* on the right Leg.

46 The *Peronæus longus*.

47 The *Gastrocnemius internus*.

48 The *Gastrocnemius externus*.

49, 49 Parts of the *Soleus* in both Legs.

50 *Extensor Pollicis longus*.

51 *Extensor Pollicis brevis* in both Feet.

52 *Abductor Pollicis*.

53 Part of the *Tibialis Posticus*.

C H A P.

C H A P. VII.

Of the BONES and MUSCLES which form the
LOWER VENTER, or REGION of the
TRUNK.

S Y L L A B U S

*Spectandorum in Trunci Corporis Regione
inferiore*

Vertebra Lumborum	{	Numerus	
		Articulatio	
		Processus	
		Foramina	
		Magnitudo	
Os Sacrum	{	Substantia	{ in Infantibus in Adultis.
		Foramina	
Os Coccygis	{	Ligamenta	
		Musculi	
Ossa Innominata	{	Ilium	{ Spina Dorsum Costa
		Coxendicis	
		Os Pubis	Acetabulum
	{	cujus Differentia	{ Virilem Muliebrem
		inter Sexum	
Musculi	{	Longissimus Dorsi	
		Semispinatus	
		Sacer	
		Quadratus	{ Lumborum
		Spinalis	
		Psoas Parvus	

Having

HAVING done with the first Region of the *Trunk*, and the Parts appended to, and moving upon it; we come to the second or Lower: In which we shall consider the Parts of the *Loins* and the *Pelvis* at their bottom; and according to our usual Method, we shall first describe the Bones which are the true *Vertebrae* of the *Loins*, the spurious ones of the *Os Sacrum*, and *Ossa Innominata*.

Verte-
bræ of
the Loins.
Tab. 21, 22

The *Vertebrae* of the *Loins* are in number five, and are larger and thicker than those of the Neck or Back, and more loosely articulated one with another, for the more easie *Inclination*, or stooping of the Body downwards: They have the same Processes with the other *Vertebrae*, with this difference, that in these the Spinal Process is broader and thicker than elsewhere, and the transverse Process is longer, without any Perforation, as those of the Neck have; neither has the Body of the *Vertebra* any lateral *Sinus*, as those of the Back have, for the Reception of the Head of the Ribs. They are gradually larger, as they approach nearer to the *Os Sacrum*; which is indeed observable thro' the whole Tract of the Spine, from the Head downwards, the lower being every where somewhat larger than the upper: But this enlargement in the *Loins* is more remarkable than

than elsewhere, especially in the last *Vertebra* of all, which joins

The *Os Sacrum*, which consists of six Os Sacrum. Tab. 21, 22 Bones; tho' sometimes it has been observ'd to have one more or one less. These are call'd *Vertebrae*, but *spurious*, and appear very distinct in Infants, but in Adults they generally coalesce, so as to seem but one Bone of an Equilateral triangular Figure with the *Basis* upwards, which is ty'd to the last *Vertebra* of the Loins, and laterally by long, thick and broad Processes, to the *Os Ilium* on either side: The exterior, or back-part of the *Os Sacrum*, is rugged, and a little convex; the interior smooth and concave. It has ordinarily five Perforations on either side, which enlarging themselves backwards and forwards, are in a manner double, thro' which pass some of the Nerves which make the *Cauda Equina*, and are the Production of the *Spinal Marrow*, which has no farther Passage through the middle or great Perforation of the *Vertebra*, than to the last of the Loins, these *spurious* of the *Os Sacrum* having no Hollow. Foramina. Tab. 21. & 22.

To the lower Bone of the *Os Sacrum* is join'd the *Os Coccygis* consisting of three or Os Coccygis. Tab. 22. four little Bones, and two Cartilages. It resembles a little Tail; the lower Bone, as in the *Os Sacrum*, growing gradually less than the upper, till it ends in a Cartilaginous Point, which is turn'd inwards for the
conve-

convenience of sitting ^{with} ~~that~~ Case. These Bones are but loosely join'd together, especially in Women, in whom at the time of Parturition they easily give way, and are by skillful *Midwives* thrust back at that time, without damage; but by the unskillful sometimes so rudely, as to cause excessive Pain in the time of Labour, and many ill Consequences after. This Bone serves to sustain the *Intestinum rectum*, and has ^{twelve} Muscles in common with the *Anus*, to draw it upwards or inwards; taken notice of by *Joannis Riolanus*, *Anthropograph. Lib. V. Cap. 40.* after describing the *Levatores Ani*, with the *Musculi transversales Pelvis*, which he thinks belongs to the *Anus*, he says, *Reperitur quintus Levator Ani, qui Coccygi & Ossis Sacri extremo affigitur.* These I call *Musculi Coccygis*: They arise broad and fleshy, from the *Os Ischium* at the extremity and on each side a sharp Process of that Bone, that is between the *Musculi Marsupialis* and *Pyriformis*, and terminate after an oblique descent on each side the *Os Coccygis*, and adjoining part of the *Os Sacrum*: When they act, they draw the *Os Coccygis* upwards and inwards, and are Antagonists to two Ligaments, that spring from the back-part of the *Os Sacrum*, and terminate in the external Surface of the *Os Coccygis*, which keeps that Bone from being thrust inwards on several occasions, particularly in riding on Horseback, &c. The

Musculus
Coccygis
Tab. 27.

Ligamen-
ta.

The *Ossa Innominata* are two large Bones situated on either side of the *Os Sacrum*, and are call'd likewise *Ossa Coxae & Coxendicis*, in *English*, the *Hip-Bones*. In Infants each of these Bones consists of three distinct ones, separated by Cartilages, which in Adults grow up, and make but one firm solid Bone, whose Parts however retain three distinct Names, according to their former division.

Ossa Innominata

The upper and broader Part is call'd *Os Ilium*, from the Intestine of that Name, which lies in the inside of it, and is join'd to the *Os Sacrum* by a Cartilage, and a very strong membranous Ligament. The outward *Rim* of this Bone represents in Figure, a large Segment of a Circle, which is call'd the Spine of the *Ilium*. The back-edge of this Rim is call'd the *Dorsum*, and the inner *Costa*. In Women this Bone is much larger than in Men, and the Spine of each farther distant from one another.

Os Ilium.
Tab. 22.

Spina Ilium.
Dorsum.
Costa.
Tab. ib.

The lower part of the *Innominatum* is call'd the *Ischium*, and by some peculiarly *Os Coxendicis*. The Cavity commonly said to be in this Bone, call'd *Acetabulum*, is fram'd at the meeting of this with the *Ilium* and *Os Pubis*, as appears in the *Fætus*; but in Adults no marks of this union appear in this large deep Cavity, in which the Head of the Thigh-bone is receiv'd; at the bottom of which lies a large mucilaginous

Ischium.
Tab. ib.

Acetabulum. *App.*
50. Fig. 6.

nous Gland. It is lin'd and tip'd round with a Cartilage, whose circular Margin is call'd *Supercilium*. At its juncture with the
Tab. 22, 36 *Os Pubis*, is the *Foramen Ischii & Pubis*, a large Hole common to it and that Bone; and at its lower end a large Protuberance, which serves us like a Stool to sit upon, and a little above it, on the hinder-part, is another small acute Process, near which is a *Sinus*, that gives Passage to the Tendon of the *Obturator internus*.

Os Pubis.
Tab. 21, 22 The fore-part of the *Innominatum* is the *Os Pubis*, or *Pectinis*; which is thinner and lighter than the rest, and perforated as before-mentioned: This is join'd to its Fellow *per Synchondrosin*, or by an intermediate Cartilage, where in Women they form an Arch much larger than in Men: Besides this difference, we find the Spines of the *Os Ilium* stand at a greater distance from each other, and that Bone much flatter in Women than in Men.

Pelvis.
Tab. 21. All these Bones, which are larger and more concave in Women than in Men put together, form that Cavity in the bottom of the *Abdomen*, which is call'd the *Pelvis*; wherein lies in Men the Bladder of Urine, and part of the lower Intestines; and besides these, in Women the *Uterus*, who having for the convenience of the *Fætus*, a larger *Pelvis*, and wider opening below for the Passage of it, are therefore in proportion much larger about the Hips than Men.

Authors are very confus'd and perplex'd ^{Muscles of the Loins} about the *Muscles* which move the *Loins*; probably upon the account of that great and various Motion which no other part of the *Trunk* has: The most distinct and best agreed account reduces them to four Pair: Two of which are *common* to them and the Back, and two *proper*, or serving for their Motion only.

The first of the *common* is the *Longissimus Dorsi*, which rises from the upper part of the *Os Sacrum*, *Os Ilium*, and the first *Vertebra* of the Loins, and in its beginning is confounded, if not the same with the *Sacro-lumbalis*, describ'd among the Muscles of the Back. It runs upwards along the whole Tract of the Back, and is connected to every transverse Process in its way, and ends sometimes in the first *Vertebra* of the Back, sometimes in the first of the Neck, and (as some Authors say) reaches now and then to the *Processus Mammillaris* of the *Os Petrosum*. ^{Longissimusdorsi. Tab. 27.3.}

The *Semispinatus* rises from the Spines of the *Os Sacrum*, and in its Origin joins the *Latissimus Dorsi*. It runs over all the *Vertebrae* of the Loins and Back, and sends a Tendon to every Spine, by which means it serves to erect the whole Trunk. ^{Semispinatus. Tab. ib. Action.}

The *Musculus Sacer* has its Origin on the hinder part of the *Os Sacrum*, and runs along under the *Longissimus Dorsi*, and with its ^{Sacer. App. Tab. 47. Fig. 2.}

Tab. XXVI. p. 721.

a Os Jugale
b Glandula Parotis



Tab. XXVI.





T A B. XXVI.

The External Muscles on the Back-parts.

- a, **T**H E *Os Jugale.*
 b, The *Parotid Gland.*
 c, The Spines of the *Vertebra* of the Back.
 d, The *Basis Scapulae.*
 1 The *Musculus Occipitalis.*
 2 Part of the *Temporalis.*
 3 *Elevator Auriculae.*
 4 *Zygomaticus.*
 5 Parts of the *Splenius.*
 6 Part of the *Masseter.*
 7 Part of the *Mastoideus.*
 8 A small Portion of the *Elevator Scapulae.*
 9 The *Cucullaris.*
 ee, Its tendinous part that unites with its Partner.
 e, Another Tendon of the *Cucullaris* that terminates in the *Spina Scapulae*.*
 10 The *Deltoides.*
 11 *Infraspinalis.*
 12 *Rotundus minor.*
 13 *Rotundus major.*
 14 *Gemellus*, or *Biceps externus.*
 15 Part of the *Biceps.*
 16 Part of the *Supinator Radii longus.*
 17 *Extensor minimi Digiti.*
 18 *Extensor Carpi Ulnaris.*
 19 *Radialis extensor Carpi.*
 20 *Extensor Digitorum communis.*
 21 The Muscles extending the Thumb.
 AA, The *Anconaeus* in both Arms.

- 22 *Abductor minimi Digiti.*
 23 *Interossei.*
 24 *Abductor Indicis.*
 25 *Abductor Pollicis ad Dorsum manus.*
 26 Parts of the *Ulnaris Flexor Carpi* in both Arms.
 † The *Ligamentum Annulare.*
 27 Part of the *Flexor Digitorum Perforatus* in the left Arm.
 28 The *Latissimus Dorsi.*
 ff, Its thin Tendon, which springs from the *Vertebrae* of the Back, Loins and *Os Sacrum*, under which are the beginnings of the *Musculi Sacrolumbalis*, and *Dorsi longissimus.*
 g, The Spine of the *Os Ilium.*
 29 29 Parts of the *Rhomboides*, near the lower Angles of each *Scapula.*
 30 30 Portions of the *Sacrolumbales* and *Dorsi longissimi* seen in the triangular Interstice here exprest.
 31 31 Parts of the oblique descending *Muscles* of the *Abdomen.*
 32 Parts of the *Gluteus medius.*
 33 The *Gluteus maximus.*
 34 A small Portion of the *Membranofus.*
 35 *Vastus externus.*
 36 Portions of the *Triceps.*
 37 The *Gracilis* only seen in the right Thigh.
 38 The *Semimembranofus.*
 39 *Seminervofus.*
 40 *Biceps.*
 h, The Trunk of Nerves and Blood-Vessels passing the *Ham.*
 i, The Trunk of a Nerve marching with the Tendon of the *Biceps Femoris.*

41 41 The *Gastrocnemius externus* and *internus*.

42 *Soleus*.

43 *Peronæus primus*.

44 *Peronæus secundus*.

k, The *Malleolus externus*.

l, The *Malleolus internus*.

45 The *Musculus Abductor minimi Digiti*.

C H A P. VIII.

Of the BONES and MUSCLES of the THIGH,
LEG and FOOT.

SYLLABUS

Eorum quæ in Femore, Crure & Pede ex-
tremo motanda sunt.

Os Femoris	{	Epiphyses	{	Caput	
		Cervix		Trochanter major	
		Substantia	—	minor	
		Cavitas			
		Linea Aspera			
		Processus inferiores			
		Ligamentum	{	Latum	
Cartilagine	Rotundum				
		Lunatae			
Tibia	{	Processus superior	Malleolum internum constituens		
		Epiphyses inferior			
Fibula	{	Epiphyses superior	Malleolum externum formans		
		Epiphyses inferior			
Patella	{	Figura			
		Connexio			
		Usus			
		Psoas major			
	{	Iliacus internus			
		Pectineus			
		Gluteus		{	major
					medius
	minor				
Musculi Femoris	{	Triceps			
		Pyramiformis			
		Marsupialis			
		Quadratus			
		Obturator externus			

Musculi

Musculi Tibiae	{	Biceps	
		Seminervosus	
		Seminembranosus	
		Gracilis	
		Rectus	
		Vastus	{ externus internus
		Crureus	
		Sartorius	
		Popliteus	
		Membranosus	
Pes divisus in	{	Tarsum	
		Metatarsum	
		Digitos	
Ossa	{	Talus	
		Calx	
		Naviculare	
		Cuboides	
		Cuneiformia	{ majus medium minus
		Metatarsi No. 5.	
		Digitorum Pedis No. 14.	
		Sesamoidea No. 10.	
		Gastrocnemius	{ externus internus
		Plantaris	
Musculi Pedis	{	Tibialis Anticus	
		Peronæus Anticus	
		Tibialis Posticus	
		Peronæus Posticus	
		Perforatus	
Digitorum Pedis	{	Perforans	
		Extensor longus	
		—brevis	
		Lumbricales	
		Interossei	
Minimi Digiti	{	Abductor	
		Abductor	
		Transversales	
Pollicis	{	Extensor longus	
		—brevis	
		Flexor longus	
		—brevis	
		Abductor	
		Adductor	

Os Fe-
moris.
Tab. 22.

THE *Thigh* has but one Bone, which is the largest and longest of the whole Body, exceeding the *Os Humeri* in length about a third, and in thickness more: It is call'd *Os Femoris*, and sometimes simply *Femur*. It is pretty much incurvated, the convex part being before, and the concave behind. It has three *Epiphyses*, which in Children are so distinct from the Bone, as to be easily separable.

Epiphy-
ses.
Tab. ib.

Head.

Ligaments

Neck.
Tab. 22.

The first of these is the largest and most prominent, and has a large round Head, cap'd with a Cartilage, which is receiv'd into the *Acetabulum* or Socket at the *Ischium* or *Os Coxendicis*; to which it is fastned by two Ligaments: One broad, thick and membranous, surrounding the whole Edge of the *Acetabulum* and Head of the Bone: The other short, thick and round, springing from the bottom of the *Acetabulum*, by the side of the *Mucilaginous Gland* (which is here the most considerable of the whole Body) and is inserted into the middle of the Cartilaginous Head. The *Epiphysis*, or Neck of the Bone, on which this Head is seated, springs laterally from the upper end of the Bone, by which means the *Thighs* are kept at greater distance than otherwise they would be, and thereby make more room in those Parts for several necessary purposes.

The

The second Process, or *Epiphysis*, is situated at the bottom of the Neck, on the outside of the Thigh-bone, and is call'd *Trochanter*, or *Rotator major*. It has a small *Sinus*, in which are inserted the *Quadrageminus* and *Obturator* Muscles.

Trochanter major
Tab. 22.

The third *Epiphysis* is on the hind-part of the Bone, somewhat lower and less than the former, and is call'd *Trochanter minor*. The Surface of both these *Epiphyses* is somewhat asperous for the better hold of divers Muscles which are inserted into them.

Trochanter minor
Tab. 21, 22

The *Body* of the Bone is very hard, consisting of many *Lamine*, or *Plates* of Bone, with interspers'd *Cellulae*, or *Loculi*, of which we have spoken more particularly in the general Description of the Bones. It has within the longest and largest Hollow of any of the Bones fill'd with *Marrow*, the use and manner of whose Conveyance has been already spoken to. On the outside it has a small Ridge, which runs along it on the back-side from one end to the other, where Muscles are inserted, and is call'd *Linea Aspera*.

Body.

Linea Aspera.

At the lower end it has two pretty large round Processes (improperly by some call'd *Heads*, from the resemblance in Figure to the true Head) each cover'd with a Cartilage, between which is a large deep *Sinus*, by means of which it is articulated with the *Tibia* by a true *Ginglymus*, this

Lower Processes
Tab. 22.

A a a 4

Sinus

Sinus receiving the Process in the middle of the Head of the *Tibia*.

Tibia, or
Focile
majus.
Tab. 21.

The *Leg*, from the *Knee* to the *Foot*, is call'd *Tibia*, and consists of two Bones; the inner whereof is not much inferior in length or bigness to the *Femur*. It is a large, hard, angular Bone with a Cavity in the middle, tho' but small for the bigness of the Bone. It has three edges or corners, which render it in a manner three square; the foremost of which is the most acute, and is call'd the *Shin*: At the upper end it has two large *Sinus*, or Cavities, cover'd with a soft smooth Cartilage call'd *Lunata*; these *Sinus* receive the two lower Processes of the *Femur*, and are divided by an intermediate Process, which enters the *Sinus* at the lower end of the *Femur* before spoken of, so making a true *Ginglymus*, each Bone receiving and being receiv'd.

Patella.
Tab. 21.

This *Joint*, which is call'd the *Knee*, is cover'd on the middle of the fore-part by a pretty round Bone on the outside, somewhat of the Figure of a Shield, about two Inches Diameter, somewhat convex on both sides, but most on the outer, and cover'd with a smooth Cartilage. This Bone is call'd *Patella*, *Mola* and *Rotula*, in *English*, the *Knee-pan*: Over it slides the Tendons of the Muscles that extend the Leg as upon a *Trochlea* or *Pully*; but its more peculiar use is to hinder the Leg from

from being bent forwards in Extension, as it necessarily must be in this sort of Articulation, if this Bone did not, like a Bolster, check its rolling too forwards, as the *Olecranon* does the Swing of the *Cubitus* too backwards in the Extension of that Joint, by catching in the *Sinus* of the *Humerus*, and stopping it there. In an erect Posture, when one Foot is set forward, the whole weight of the Body above bears upon the *Patella*, which in that situation hinders the Knee from bending backwards, and straining the Muscles that inflect it behind, which the weight of the Body, added to the force of the extending Muscles must otherwise necessarily occasion, as in going down Hill, where the Body must necessarily rest upon the extended Foot, which is set foremost till the other be brought forwards. Hence *Galen's Wrestler*, who had dislocated his *Patella*, found so much Pain and trouble in going down Hill.

There are sometimes found two *Ossa Sesamoidea*, in the two beginnings of the *Gastrocnemius externus* Muscle, but these are rarely met with, and only in aged Bodies.

Having thus far describ'd the *Tibia* and *Patella*, only to shew the lower Articulation of the *Femur*, we shall return to the Muscles which move the *Thigh*, and proceed in our usual Method.

The

Number.

The Number of *Muscles* which move the Thigh, is variously reported by Authors, who have been pleas'd to split and join Muscles arbitrarily as they thought fit: But the number most generally agreed on is Nine; tho' two of these being again subdivided, the *Triceps* into three, and the *Quadrigeminus* into four, they make in all fourteen. Some of these serve to bend the Thigh, others to extend it, some to draw it inwards, others outwards, and several of them acting together to give it a rotatory motion, which this Joint has, tho' not so conspicuous as the *Humerus*.

Psoas major.

App. Tab. 45. Fig. 1.

The first of the *Flexors* is the *Psoas major*, or *Lumbaris*; which is a round, hard, fleshy Muscle, arising from the transverse Processes of all the *Vertebrae* of the Loins, and passing along on each side of the *Vertebrae*, runs over the superior part of the *Os Sacrum* and Spine of the *Ilium*, and is inserted into the lower part of the lesser *Trochanter*.

Iliacus internus. Ibid.

The *Iliacus internus* arises fleshy from the concave part of the inside of the *Ilium*, and in its descent joins with the *Psoas*, and is inserted with it.

Pectineus Tab. 25.

The *Pectineus*, so call'd from its Origin at the external part of the *Os Pectinis*, rises thick, broad and fleshy, and is inserted on the hinder part of the *Femur*, a little below the lesser *Trochanter*. These three

three Muscles conspire to draw up the *Thigh*. *Action.*

The *Glutæi* are three Muscles of the *Glutæi* same Name, which co-operate in extending the Thigh: The *first*, which is call'd *Action.* *Major*, arises semi-circular from the *Os Coccygis*, the Spines of the *Sacrum*, and the *Spine* of the *Ilium*; whence forming a large fleshy Muscle, it descends to the *Linea Aspera*, four Fingers breadth below the great *Trochanter*. *Major. Tab. 26.*

The *Glutæus medius* arises fleshy from the external part of the Spine of the *Ilium*, and is inserted by a strong short Tendon, into the superior external part of the great *Trochanter*. *Glutæus medius. Ibid.*

The *Minor* lies under the former, and arises semi-circular, broad and fleshy from the *Dorsum Ilii*, and ends at the upper part of the great *Trochanter*. These three Muscles together make the Flesh of the Buttocks. *Glutæus minor. Tab. 27.*

The *Triceps* is properly three Muscles which spring all from the *Os Pubis*: One at its Junction at the *Ischium*; another from the middle, and the third from the lower part, and are inserted all one above another into the *Linea Aspera*, of which they take up the greater part, the lower reaching to the lower *Apophysis* of the Thigh-bone inwards. These are the *Ad-ductores*, and draw the Thighs together. *Triceps. Tab. 25. Action.*

The

Quadri-
geminus.

The next is the *Quadrigeminus*, which consists likewise of four Muscles, which turn the Thigh outwards.

Pyriformis.
Tab. 27.

The first of these is the *Pyriformis*, or *Iliacus externus*, which arises from the internal concave part of the *Os Sacrum* towards the bottom, and descending obliquely along the great *Sinus* of the *Os Ilium*, from a round fleshy Origin joins the *Gluteus medius*, and is inserted by a round Tendon at the bottom of the great *Trochanter*.

Gemini.

The second and third are call'd *Gemini*. They arise from the *Os Pubis* and *Ischium*, and the Ligament that spreads over the great *Foramen*, and being broad and fleshy, are by Authors divided into the *Mar-*
supialis, so call'd from an imaginary resemblance of a *Purse*: The other *Obturator internus*, not from its use, but from its running over and covering the great *Foramen*. They are both inserted into the *Sinus* at the bottom of the great *Trochanter*.

Marfupialis.
Tab. 27.
Obturator internus.

Quadratus.
Ibid.

The fourth is the *Quadratus*, which rises from the *Apophysis* of the *Ischium*, and maintains an equal breadth and bulk to its Insertion, just below the great *Trochanter* on the outside.

Obturator externus.
Ibid.

The last is the *Obturator externus*, nam'd likewise from its situation. It arises fleshy from the exterior Margin of the *Os Pubis* and *Ischium*, and is inserted tendinous at the Root of the great *Trochanter*. Some

Some Authors have describ'd another *Obturator internus*, but they seem to have been confounded by the different Names and Ways of describing that have been us'd by Anatomists, and to mean only that part of the *Marsupialis* which Mr. Comper has call'd *Obturator internus*. But we leave this to the Decision of further Inquiry.

The Head of the *Tibia*, and its Articulation with the *Femur*, has been already describ'd, the better to give an *Idea* of their Motion together: For the same reason the *Patella* likewise has been describ'd, that we might not be oblig'd to return to that Articulation.

The lower end of the *Tibia* is much smaller than the upper, and has a considerable Process, which forms the inner Ankle, and a pretty large *Sinus*, divided in the middle by a Process, which is receiv'd into the concave part, or *Sinus* of the *Astragalus*, as its *Sinus* receives the convex part of the same Bone.

Lower end of the Tibia.

Malleolus internus.
Tab. 21.

The Leg consists likewise of another Bone, which is call'd *Perone*, *Fibula*, *Sura*, and *Focile minus*; which lies on the outside of the Leg, and is join'd at the upper end to the *Tibia*, just below the *Knee*, by a *Sinus*, which receives the lateral Protuberance of the upper end of the *Tibia*: Its lower end is receiv'd into a *Sinus* of the *Tibia*, and then shoots out into a large Pro-

Fibula.
Tab. 21.

Malleo-
lus ex-
ternus.
Tab. 21.

Process, which makes the outer Ankle, and embraces the outside of the *Astragalus*. The *Tibia* and *Fibula* touch one another only at their Extremities, like the *Radius* and *Cubitus*, and are join'd *per Arthrodiām*: Besides which they are ty'd together by a strong membranous Ligament, which fills up the Cavity between the two Bones. On the inside of this outer Ankle is a *Sinus*, to which answers a Protuberance in the *Talus*.

Muscles.

The *Tibia*, or *Leg*, is bent by four hinder Muscles; extended by four: It is moved inwards by one, and outwards by two.

Biceps.
Tibiæ.
Tab. 26.

The Muscles that bend the Knee, are first the *Biceps*, which is a double-headed Muscle. The first of whose Heads arises with a round Tendon from the Protuberance of the *Ischium*, and becoming fleshy after about half its Progress, is join'd by the other from the *Linea Aspera* of the *Femur*: The Bellies of this Muscle are likewise distinct, which joining at last in a *Tail* or *Tendon*, are inserted into the hinder-part or upper *Apophysis* of the *Fibula*.

Seminervosus.
Ibid.

The *Seminervosus* arises half fleshy half tendinous, near the former, and is inserted by a round Tendon into the internal *Epiphysis* of the *Tibia*.

Semimembranosus.
Ibid.

The *Semimembranosus* arises from the same Eminence of the *Ischium*, a little higher, and is inserted by a short thick Tendon

don into the upper and back-part of the *Tibia*.

The *Gracilis*, so call'd from its being the slenderest of these Muscles, arises from the Juncture of the *Os Pubis* and *Ischium*, and is inserted into the upper and inner side of the *Tibia*. These four bend the Knee.

Gracilis.
Tab. 25.

Action.

The Leg is extended likewise by four Muscles; which are the *Rectus*, the two *Vasti*, and the *Crureus*.

The *Rectus* rises with a sharp beginning, from a Protuberance a little below the Margin of the Spine of the *Ilium*, between that and the *Acetabulum*. It runs with a smooth Belly between the two *Vasti*, and becoming gradually tendinous, ends at the Protuberance of the *Patella*, a little below the Knee.

Rectus.
Tab. 23, 24.

The *Vasti* are two, *Externus* & *Internus*, so nam'd from their largeness by a barbarous *Latin* Term.

The *Vastus externus* springs from the Root of the great *Trochanter*, and from the *Linea Aspera*, outwardly tendinous, and inwardly fleshy, and descending obliquely forwards becomes *vice versa*, tendinous internally, and fleshy externally, till meeting with the Tendon of the former, it grows intirely tendinous, and is inserted together with it.

Vastus externus.
Tab. 23, 24.
& 25.

The *Vastus internus* arises likewise partly tendinous, and partly fleshy, from the

Internus.
Ibid.

Linea

Linea Aspera, immediately below the lesser *Trochanter*, upon the outside of the Bone, and is continu'd almost to the lower *Apo-physis* of the same Bone on the inside, whence it descends obliquely almost semi-circularly, and growing tendinous, at once joins and is inserted with the former.

Crureus.
Tab. 25.

The *Crureus*, so call'd from its situation on the Thigh, like the *Brachius* on the Arm, is the last of the *Extensores*. It arises from the fore-part of the Thigh-Bone, between the *Trochanters*, and runs down the whole length of the Bone, and joining its Tendon to the rest, is inserted together with them.

Action.

These all serve to extend the Leg, and tho' from their several Originations they have different Names, may be as reasonably accounted one *Polyventer* Muscle, as many others of the Body are.

The Leg is mov'd obliquely inwards and outwards by three Muscles.

Longus.
Tab. 23, 25

That which draws inwards is call'd *Longus*, or *Sartorius*, from the use *Tailors*, who set cross-legg'd, make of it. It is called likewise *Fascialis*, from its running over the other Muscles of the Leg and Thigh like a Swathe. It arises from the fore-part of the Spine of the *Os Ilium*, and descending obliquely inwards, runs over the *Rectus*, and *Vastus internus*, and part of the *Triceps*, and a little below the middle of the

the inside of the Thigh meets with the *Gracilis*, from whence it runs tendinous over the inferior internal Head of the Thigh-bone, under a covering of the *Fascia lata*, and is inserted about four fingers breadth below the Head of the *Tibia*, on its inside forwards. It brings the Legs together and across.

Action.

The *Popliteus*, or *Subpopliteus* arises with a short strong Tendon from the external inferior Protuberance of the Thigh-bone, and running obliquely cross the Joint is inserted broad into the upper part of the *Tibia* on the inside a little below its upper *Apophysis*. It not only antagonizes the *Taylor's* Muscle, but assists the Benders likewise.

Popliteus.
Tab. 27.

Action.

The *Membranosus*, or *Fascia lata* arises fleshy from the fore-part of the Spine of the *Ilium*, but soon becomes membranous, and covers almost all the Muscles of the Thigh and Leg down to the Foot, and in its Action turns the Leg outwards.

Membranosus, or
Fascia
lata.
Tab. 24.

Action.

The *Foot* is divided into three parts, the *Tarsus*, *Metatarsus*, and *Digiti* or *Toes*.

Parts of
the Foot.

The *Tarsus*, is that Space which is between the Ankle and the Body of the *Foot* call'd *Metatarsus*, and answers the Wrist in the Hand: It consists of seven Bones.

Tarsus.
Tab. 21.

The first is call'd *Talus*, or *Astragalus*, or *Os Balistæ*: This Bone has, as it were, six Sides or Faces. The upper Face of it is

Talus.
Ibid.

B b b part.

partly convex, partly concave, and cover'd with a Cartilage. Its Head is receiv'd into the *Sinus* at the lower end of the *Tibia*, and its Hollow receives the small Protuberance of that Bone. The lateral Faces of it are in a manner plain, and are connected to the Processes of the *Tibia* and *Fibula*, which make the Ankles. The fore-part is gibbous, and is receiv'd into a *Sinus* of the *Os Naviculare*. The hind-part is sinuous, and receives part of the *Calcaneum*, or Bone of the Heel: On the under side on the hinder-part, it has a pretty large *Sinus*, which receives the upper and hinder-part of the *Calx*, and towards the fore-part of the same side it has a Protuberance, which is received into a *Sinus* of the same Bone, so that on both sides this little Bone is articulated by a *Ginglymus*: On the upper, to the *Focile majus* or *Tibia*; on the under with the *Calcaneum*; and laterally *per Arthrodiam*, or slight Connection.

Calx.

Tab. 22.

The next is the *Calx*, *Calcaneum*, *Calcar Pedis*, which is the biggest and thickest of all the Bones of the Foot. It lies under the *Astragalus*, to which it is articulated as already describ'd. On the hinder-part it has a large Protuberance, into which is inserted the great *Tendon* of the *Gastrocnemii*, or *Chorda Achillis*. On the fore-part it has a Cavity, which receives the *Os Cubiforme*; on the inside it has a notable *Sinus*, through which runs

runs the *Arteries Veins* and *Nerves* with the *Tendons* that move the Foot inwards, and bend the Toes ; and between that and the *Astragalus*, towards the *Metatarsus*, is a Cavity, in which lies a *mucilaginous Gland*, with Fat for the Lubrication of the Cartilages and Tendons.

The third is the *Naviculare*, or *Scaphoides*, which lies between the *Astragalus* and the *Ossa Cuneiformia*: On the hinder-part it has a large *Sinus*, which receives the forehead of the *Talus* ; and on its fore-part it is divided into three small Heads, which are receiv'd into so many *Sinus* in the hinder-part of the *Cuneiforme Bones*.

Navicu-
lare.
Tab. 22.

The *Ossa Cuneiformia* are in Number three, and are generally by Authors call'd *Innominata*, but nam'd *Cuneiformia* by *Fallopious*, from their Figure, which is thick on the upper-part, with a *Sinus* in each ; on the under-part thin. They are join'd as before-said to the *Astragalus*, and at the fore-end to the Bones of the *Metatarsus*. They are of unequal bigness ; that at the side of the great Toe being the biggest, that at the opposite side next in size, and the middle one least : On the upper-side they are convex, on the under a little concave, to favour the *Tendons* that lie under.

Ossa Cu-
neiformia.
Tab. 21.

The last Bone of the *Tarsus* is the *Cubiforme* of a Figure irregularly Cubical. It is rang'd along the *Cuneiformia*, on the side

Cuboides
Tab. 22.

of the Foot: Behind, it is join'd to the *Os Calcis*; before, to the two outward Bones of the *Metatarsus*, and on the inside to the third *Os Cuneiforme*.

Metatar-
sus.
Tab. 21.

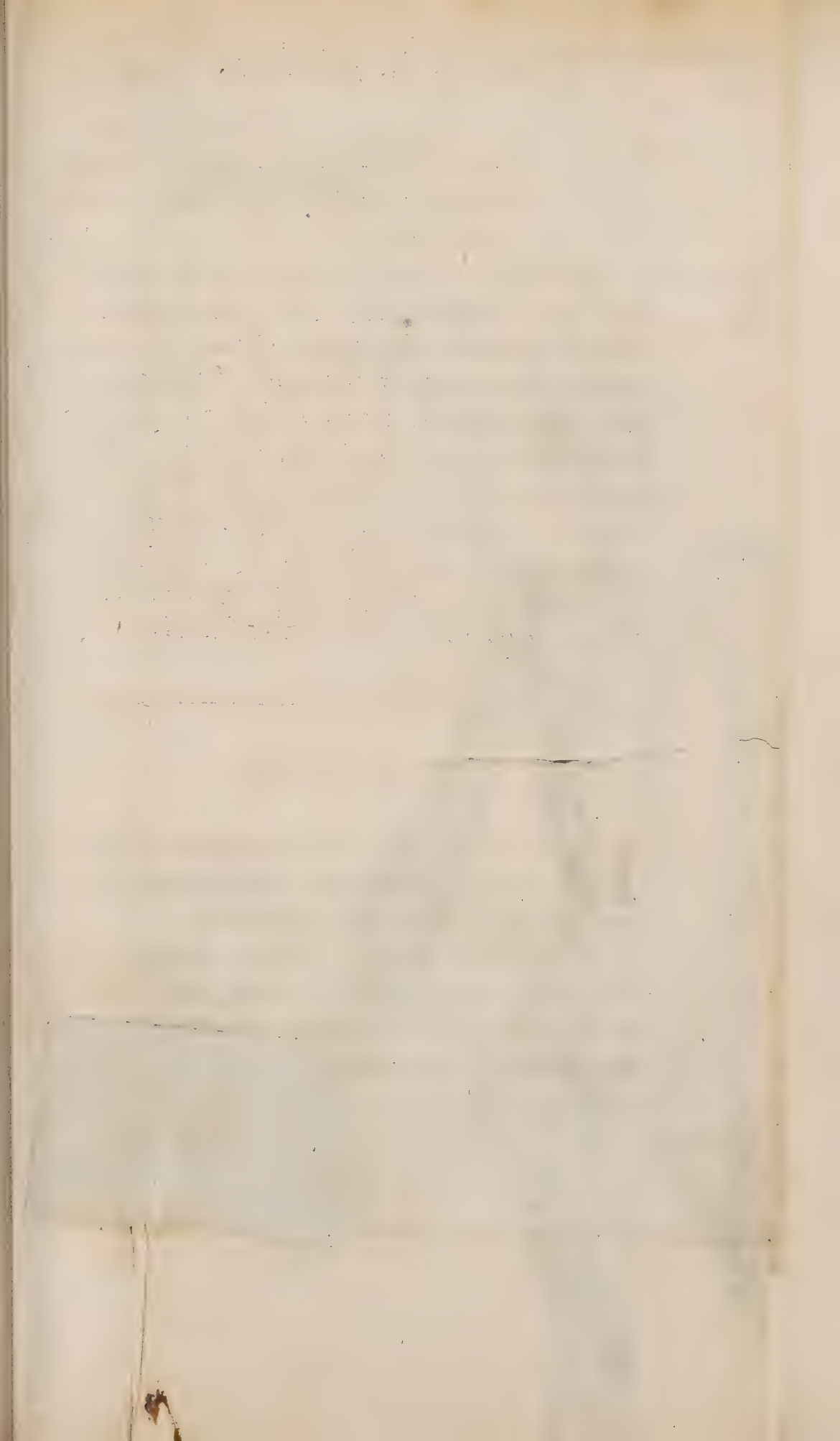
The Bones of the *Metatarsus* are in number five; whereof the first, or innermost, which sustains the great Toe, is much thicker than any of the rest: That next to it is the longest, from which to the outward they grow gradually shorter: They are longer than the Bones of the *Metacarpus*, in other things they resemble them, both as to Figure and manner of Articulation. The first three are join'd to the *Cuneiforme* Bones, the other two to the *Cuboides*.

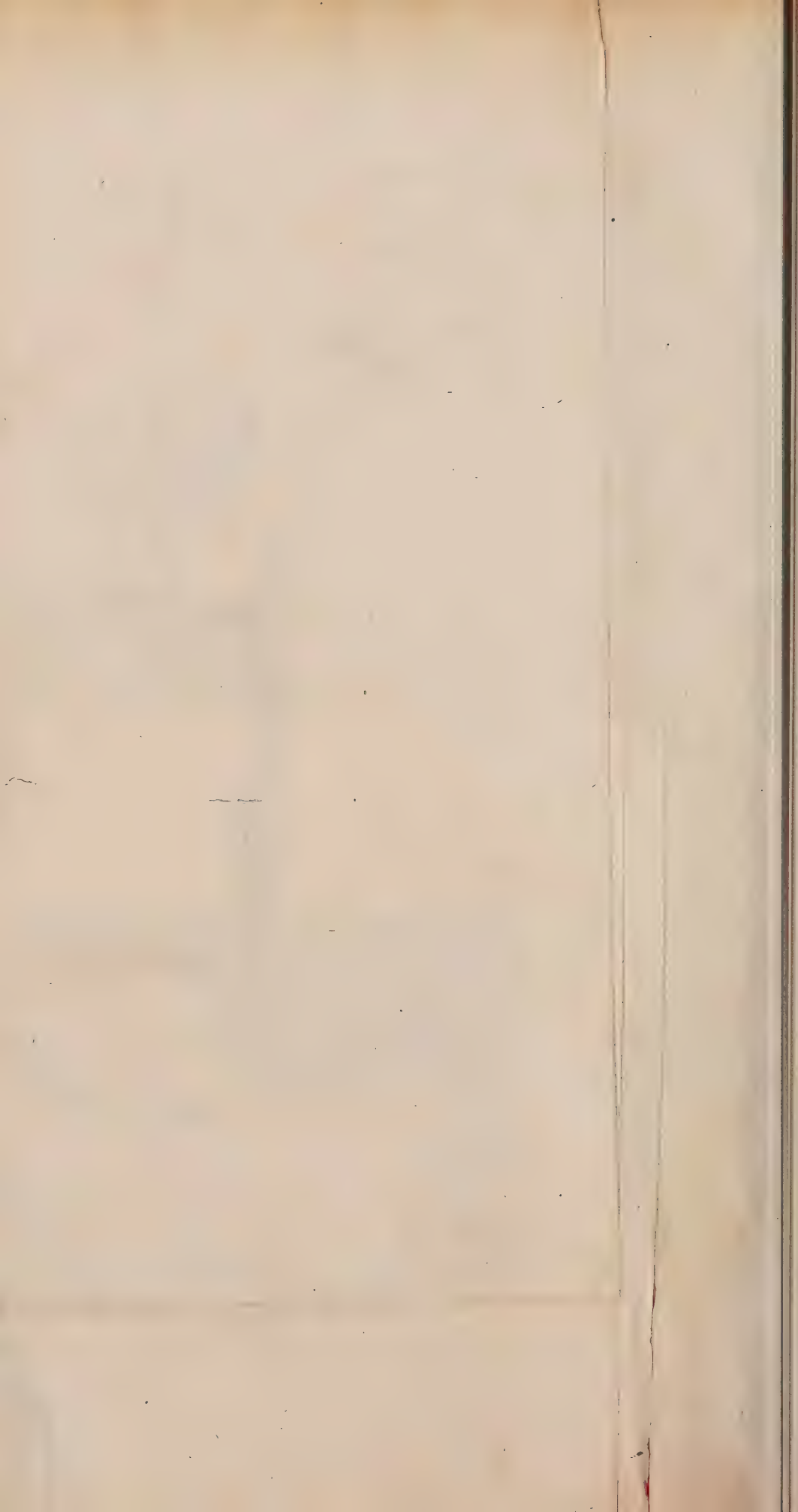
TA B. XXVII.

DIvers Muscles which appear after the external Muscles, represented in the preceeding Table, are taken off.

N.B. *The opposite Figure annex'd (or Out-line, as its call'd) having the Names of all the Parts written on it, 'tis needless to add any further Explication of this Table.*

The





Tab

In
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R

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c

The *Bones* of the *Toes* are in number ^{Bones of the Toes.} Fourteen; in every respect like those of the ^{Tab. 21.} *Fingers*, except that the *Pollex Pedis* consists of but two *Bones*, and is so seated, as to be longer than the other *Toes*, contrary to the *Thumb*; which is so plac'd, as to appear shorter than the *Fingers*; and that the second *Phalanx* of all the rest of the *Toes* are extremely short.

There are twelve *Sesamoidea* belonging ^{Sesamoidea.} to the *Toes*, and seated as in the *Fingers*.

The *Bones* of the *Feet* are ty'd together ^{Ligamentum Annulare.} by several *Ligaments*; the most considerable whereof, and which only we shall ^{Tab. 24.} have occasion often to mention by Name in the Description of the *Muscles* of the *Foot*, is the *Ligamentum Annulare*; which in all respects so resembles that of the *Carpus*, that it needs no other Description.

The *Foot* is extended by *three* *Muscles*, ^{Muscles of the Tarsus & Metatarsus.} or, according to some, by *four*. ^{Gastrocnemius externus.}

The first of these is the *Gastrocnemius*, or *Suralis externus* and *Gemellus*; which arises fleshy with two Heads from both Processes of the *Thigh-bone* in the *Ham*, which joining together, constitute one great fleshy Belly, which makes the outer part of the *Sura*, or *Calf* of the *Leg*, below which they become tendinous: Some divide this Muscle into two, upon the score of its two Heads; calling that which rises from the outer Process *Externus*, and the other *In-*

ternus, retaining thereby the usual Division, yet multiplying the number of the Muscles.

Plantaris
App. Tab.
44. Fig. 6.

The next is the *Plantaris*, which rises fleshy from the outer Tubercle of the lower *Epiphysis* of the Thigh-bone, and after letting down a little way a short slender Belly, runs in a slender Tendon between the *Gastrocnemii*, marching along with their Tendon, and proceeding onwards to the bottom of the Foot over the *Os Calcis*, expands it self under the *Soal*, upon the *Musculus Perforatus*, to which it adheres closely, as the *Palmaris* does in the Hand. Some reckon this among the Extenders of the Foot.

Gastrocnemius
internus.
Tab. 26.

The *Gastrocnemius*, or *Suralis internus*, by some call'd *Soleus*, from its resemblance in Shape to a *Soal-Fish*, arises fleshy from the external Process of the *Fibula*, and from the back-part of the *Tibia*, and dilates it self into a large fleshy Belly, which makes the inner part of the *Calf* of the *Leg*, under which it is gather'd into a strong Tendon, and closely uniting with the Tendon of the *Suralis externus*, make the great Tendon, or *Chorda Achillis*, which is inserted into the *Calcaneum*, and is, as has been before observ'd, by much the greatest and strongest Tendon of the Body, whose Wounds are said to be very dangerous. These Muscles extend the
Foot

Vid. Phil.
Transact.
Vol. 21.
No. 252.

Foot, and by their extraordinary Strength enable the Feet to sustain the weight of the whole Body, under which they would otherwise be apt to bend.

The Muscles which bend the Feet are two.

The *Tibialis Anticus* springs from the exterior Process of the *Tibia*, and becoming gradually broad and fleshy about the middle of the *Tibia*, along the fore-part of which it runs, is contracted again into a slender smooth Tendon, which passes under the *Ligamentum Annulare*, and is partly inserted to the *Os Cuneiforme majus*, and partly to the Bone of the *Metatarsus*, that supports the Great Toe. This draws the Foot up.

Tibialis Anticus.
Tab. 23, 24.

Peronæus Anticus, Longus or *Primus*, begins tendinous, and fleshy from the Head and upper half to the middle of the *Perone*, or *Fibula*, and running (as it were in a Pulley) through the Channel on the hinder-part of the outer Ankle-bone, is inserted into the upper end of the Bone of the *Metatarsus*, which joins the great Toe.

Peronæus Anticus.
Tab. 24.

This draws the Foot upwards.

Tibialis, or *Tibiæus Posticus* derives itself from both Bones of the *Tibia*, and from the Ligament that binds them together, and runs with a smooth strong Tendon, thro' the *Sinus* on the inner *Malleolus*.

Tibialis posticus, seu Nauticus.
Tab. 27.

(as on a *Trochlea*) under the *Annular Ligament* to the inside of the *Os Naviculare*: This is the *Adductor*, and draws the Foot *inwards*: From the use Sailors make of it in climbing it is sometimes call'd *Nauticus*.

Peroneus
posticus,
seu
Semifibularis.
Tab. 27.

Peroneus Posticus, or *Secundus* call'd sometimes *Semifibularis* from a fleshy sharp Origin in the back part of the *Perone*, continues down the outer Ridge of the Bone, till a little below the middle, whence forming a smooth, strong, flat Tendon, it runs thro' the same Channel at the bottom of the *Malleolus externus* with the *Longus* to the outside of the *Os Metatarsi* of the *Little Toe*.

Muscles
of the
four lesser
Toes.

The *Muscles* of the *Toes* resemble those of the *Fingers* so exactly in *Number*, *Figure*, *Use* and *Name*, that a bare enumeration with a reference to the *Hand* might suffice to give an *Idea* of them.

Perforatus.
App. Tab.
44. Fig. 6.

Perforatus Sublimis, or *Flexor Brevis* arises from the inner and lower part of the *Calcaneum*, and sends a Tendon to every Bone of the second *Phalanx* of every one of the four lesser *Toes*. In this (as in the *Perforatus* of the *Fingers*) there is a slit in each Tendon about the first Joint, which lets thro' the Tendon of the *Perforans*,

Perforans
seu Pro-
fundus.
App. Tab.
44. Fig. 6.

Which is call'd also *Flexor tertii Internodii Digitorum Pedis*, and *Flexor magnus*, and springs from the hinder-part of the *Tibia* and *Fibula*, near their Junction. It runs under

under the inner *Ankle*, and thro' the *Sinus* of the *Os Calcis*, where there is a fleshy Mass, which joins it, whence some have not unreasonably fixt one Origin of it here. It is divided into four Tendons, which run thro' the flits in the *Perforatus* to the third *Phalanx* of the Toes.

The Extenders of the Toes are nam'd *Longus* and *Brevis*.

The *Extensor Longus* derives it self from the fore-part of the upper *Epiphysis* of the *Tibia*, near the *Fibula*, and growing tendinous about the middle of it, runs in four Tendons under the Annular Ligament, to the third Bone of every Toe, except the *Pollex*.

Extensor
Longus.
Tab. 23,
24, 25.

The *Extensor Brevis* comes from the exterior and fore-part of the *Calcaneum*, and goes to the second Joint of the Toes.

Extensor
Brevis.
Tab. 24.

The *Lumbricales* are four, and arise (as in the Hand) one from each Tendon of the *profundus*. They go to the inside of each of the lesser Toes.

Lumbric-
cales.
App. Tab.
44. Fig. 7.

The *Interossei* of the *Metatarsus* in Number, Use, Figure, Origin and Insertion, answer exactly those of the same Name in the *Metacarpus*.

Interossei
lb. Fig. 9.

The *Abductor minimi Digiti* is a Muscle proper to the little Toe only, arising from the outside of the *Os Calcis*, near the exterior Bone of the *Metatarsus*, and is inserted laterally into the outside of the second Bone of that Toe.

Abductor
minimi
Digiti.
Tab. 24.

The

Trans-
versalis.
App. Tab.
44. Fig. 8.

The *Transversalis Pedis* springs from the first Joint of the *Pollex*, near the *Os Sesamoideum*, and is inserted into the Bone, that supports that next to the little Toe. It keeps the Toes together.

Musculi
Pollicis.

Most Anatomists allow but four Muscles to the Thumb, but Mr. *Comper* makes out six; assigning two Benders, and two Extenders; whereas others mention but one of each. But I choose to follow him who writes from *Autopsy*, and his own Inquiries. What therefore he has observ'd to appear constantly and regularly, I have no where scrupled to receive.

Extensor
Pollicis
Longus.
Tab. 25.

The *Extensor Pollicis Longus* rises large and fleshy, from the fore-part of the *Fibula* from a little below its upper Process, to within four fingers breadth of the lower, whence passing under the *Ligamentum Annulare*, it is inserted into the upper part of the second Bone of the great Toe.

Extensor
Brevis.
Tab. 23,
24, 25.

The *Extensor Brevis* springs fleshy from the fore-part of the *Os Calcis*, and after a short Belly, is contracted into a slender Tendon, which running obliquely over the upper part of the Foot, is inserted into the second Bone of the *Pollex*.

Flexor
Pollicis
Longus.
App. Tab.
44. Fig. 6.

The *Flexor Pollicis Longus* is deriv'd from the back-part of the *Fibula*, with a double order of Fibres, and runs tendinous under the inner Ankle, and thro' the Channel in the inner part of the Bone of the Heel, to its

its insertion at the extremity of the great Toe on the under side.

The *Flexor Brevis* arises from the middle *Cuneiform* Bone. It is short, thick and fleshy, seemingly two, and running over the Termination of the *Peroneus*, has a double insertion into the *Ossa Sessamoidea*, which are themselves fastened to the second Bone of the Toe.

Flexor
Brevis.
Tab. ib.
Fig. 8.

The *Abductor*, or *Thenar* springs from the inside of the *Os Calcis*, and from the *Os Cuneiforme majus*, and is inserted into the outside of the exterior *Os Sessamoideum Pollicis*, and draws the great Toe from the rest, which is at most but an obscure, or small Motion.

Abductor
Pollicis.
Tab. 23,
24, 25.

The *Adductor*, or *Antithenar* comes from the third *Os Cuneiforme*, and is inserted into the inside of the inner *Os Sessamoideum* of the great Toe.

Adductor
Pollicis.
App. Tab.
44. Fig. 8.

If in this Account of the Muscles the Inquisitive Reader falls short of that Satisfaction, which he might propose to himself by a longer and more distinct Account; what is here wanting, will be amply supply'd by another Edition of Mr. *Comper's Myotomia Reformata*, which that Indefatigably Inquisitive Anatomist, the Ornament of his Profession, is now preparing for the Press; wherein the curious Reader will not only be gratify'd with an exact Description

tion at large, but an elegant Figure of every Muscle in a Human Body, either of which it was not to the purpose of this Work to give. However, short as it is, I hope those that shall begin their Study in Anatomy with this Book, shall not be misled, nor the skilful Dissecters find much to reprehend; which will satisfy the Writer, whose utmost Ambition it is to spend his Time harmlessly, and not altogether unprofitably, even to others. He is not so vain, as to hope to escape Censure; that is the Lot of much greater Perfections than he will ever pretend to: He expects it, even from those who reap the Benefit of his Labours, which has been his Portion hitherto. But if the few Candid and Ingenuous accept his Attempt, he will think himself over-paid, and heartily wish well to those that will do better.

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